FIELD CROP ABSTRACTS

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LIGHT CLIMATE AND CROP GROWTH IN FINLAND

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INTRODUCTION

Finland is situated between the 60th and 70th latitudes. Long summer days, short days in winter, and a low elevation of the sun characterize the light climate there. This light climate has been investigated over a period of more than 25 years by Lunelund (1935–45). Its effect on crop growth in Finland has been investigated, especially, at the Helsinki University Experimental Farms, Viik Farm near Helsinki, latitude 60°10′N., and Muddusniemi Farm in Lapland, latitude 69°5′N. (*vide* publications of Pohjakallio *et al.*). Additional information has been obtained from numerous field experiments carried out in all parts of Finland. This research work is still in progress. However, the results published up to now, to which this article is restricted, are already sufficient to enable us to form a general picture of the problem covered by the title.

LIGHT CONDITIONS

At Muddusniemi Experimental Farm in Lapland, the sun does not sink below the horizon from 22 May to 24 July, that is, for more than 2 months. At Viik Experimental Farm, Helsinki, the length of the longest day is 18·8 hr. ; on 22 May the day-length is 17·6 hr., on 24 July 17·4 hr.

Because of the low elevation of the sun, however, the light intensity in Finland is relatively weak. Thus, in spite of the long day, the total amount of light (as solar radiation) in the summer months, is not greater in Finland than in more southerly countries. On the contrary, according to the calculations of Kalaja (1948), in the summer the total amount of solar radiation is greater between the 40th to 50th than between the 60th to 70th latitudes, and, for example, greater in South Finland than in Lapland. Moreover, clouds have a considerable effect upon the light intensity, and cloudiness in summer is greater in Lapland than in the southern parts of Finland. According to the investigations of Lunelund (1943) and Pohjakallio (1952a) the effect of cloudiness during June–August is to reduce the total amount of light by 44% in Lapland and by only 34% in South Finland. Hence, in spite of the 25% longer summer day, the total amount of light in Lapland is only 78% that of South Finland.

Moreover, from the autumnal equinox to the vernal equinox the day-length is shorter in Finland than in the countries further south. At Muddusniemi Farm, continuous night prevails from early December to early January. In South Finland the shortest day is 5·9 hr. According to Lunelund (1935) the actual daily amounts of light in Finland, at latitude 60°N. on the 15th of each month from June to December were as follows : EsH 11·5, 10·9, 8·5, 5·4, 2·7, 0·9 and 0·4, and in Lapland at latitude 69° N. : EsH 11·15, 10·5, 7·4, 4·0, 1·3, 0·2 and 0·0, respectively.* At Muddusniemi Farm (69°5′N.), from 9–14 June 1951, the light intensity was 1300 lux when the sun was visible, and 1000 lux when the sun was hidden behind clouds, at midnight, and 69000 lux and 25000 lux at noon, respectively (Pohjakallio, 1952a). Lunelund also turned his attention to the light intensity prevailing on banks of different aspects and slopes (1940a) as well as to the different wavelengths composing the light (1936, 1944, 1945).

RAPIDITY OF DEVELOPMENT OF PLANTS

Most of the plants cultivated outdoors in Finland are long-day plants, their development being the more rapid the longer the diurnal period of light. According to some experiments (Pohjakallio and Salonen, 1947) the varieties of spring wheat, oats and late barley, which in Finland normally ripen 90–100 days after sowing, did not even reach the earing stage when the diurnal light period was only 10 hr. The photoperiodic sensitivity of the early barley varieties appeared to be distinctly less ; however, when exposed to day-lengths of 10 hr., only the earliest of these (Tammi) reached full maturity, and, even so, was very late indeed.

Formerly, it was widely believed that the development of cultivated plants was more rapid in Lapland than in South Finland (cf. Hustich, 1940, 1944 ; Pohjakallio, 1951b). However, Denffer (1939) has shown that the effect of the lengthening day on the rapidity of the develop-

*Es=intensity of light, when the sky is cloudless and the elevation of the sun 45° ; in Finland Es=77,000 lux. 1 EsH=77,000 lux during 1 hr.

ment of long-day plants (*Sinapis* and *Hordeum*) manifests itself much more distinctly from 12 to 16 hr. than from 20 to 24 hr. According to his results it is to be expected that the day-lengths prevailing in Lapland and in South Finland cannot differ very much from each other in their effect on the rapidity of plant development. Besides, the intensity of light is greater in the south than in the north of Finland (Lunelund 1935 ; 1940a, b ; 1941), and high light intensity also accelerates plant development (Pohjakallio, 1951a). From field experiments, the time between the sowing and heading of certain spring cereal varieties is even longer in Lapland than in South Finland where the temperature is higher ; however, the sum of day-degrees during the same phase of spring cereals (from sowing to heading) appeared to be slightly lower in the north than in the southernmost parts of the country (Pohjakallio, 1951a, b ; 1952a ; Nuttonson, 1955). Thus, it seems reasonable to suppose that the higher light intensity in the south of Finland is nearly able, in this respect, to compensate for the effect of the continuous day prevailing in Lapland. In any case, the rate of development of spring cereals within the boundaries of Finland is obviously primarily determined by temperature (Pohjakallio, 1951a).

In experiments with potatoes in Finland, the onset of tuber formation in all the varieties investigated was delayed by the long day (Pohjakallio, 1953a). Under Finnish conditions short-day treatment by the use of dark-boxes, which exclude light but allow rain to penetrate and are fitted with light-proof openings for ventilation (Pohjakallio and Salonen, 1947), accelerated the maturing and withering of the tops of potato plants (Pohjakallio, 1953 ; cf. Wassink and Stolwijk, 1953).

ENERGY ECONOMY OF PLANTS

It has often been supposed that the continuous summer day prevailing in Lapland is especially advantageous to the energy economy of cultivated plants as compared with the effect of the light climate of South Finland (cf. Roivainen, 1937 ; Hustich, 1940 ; Tainio, 1941). It is true that, in Lapland, the light intensities in the summer nights have a very beneficial effect on the energy economy of plants (Pohjakallio, 1951c, 1954). On the other hand, the light intensity during the daytime there is relatively low (Lunelund, 1935), and the amount of light, even in the summer months proper, is lower than in South Finland (Lunelund, 1940a). According to Lundegårdh (1950) the light intensities prevailing on our globe are not too high for the assimilation of cultivated plants. Thus, our concern must be whether there is a sufficiency of light.

According to the peak yields from thousands of field experiments carried out in all parts of Finland (Pohjakallio, 1952d), light conditions do not prevent the cultivation of plants from being an economic proposition, provided that it is limited to those for which the growth period is not too short. The air-dry yields of herbage plants, green fodder-plants and summer cereals (grain + straw) have in many cases exceeded 10,000 kg. per ha., and the tuber yields of potatoes 40,000 kg. per ha. Nevertheless, no special effect of the unbroken day sufficient to compensate for the shortness of the growth period, can be established from the incidence of the peak yields at the different latitudes in Finland. The percentage of cases in which the yields just quoted have been exceeded has been a little higher in South than in North Finland. The results of these investigations (Pohjakallio, 1952d), however, suggest the probability that the light conditions prevailing in Lapland do not in themselves prevent yields three times higher than the average (about 1500 crop units* per ha.) nowadays achieved in Finland (Westermarck, 1954).

Only in certain extreme cases does the relative scantiness of light manifest itself in the energy economy of the plants. According to Viirilä (1949), *Solanum demissum*, when exposed to day-lengths of but 10 hr., develops flowers only if there are particularly sunny days in the flowering period. However, in the conditions of natural day-length, *S. demissum* flowers abundantly in Finland ; in the mountains of Mexico, where the light intensity is very high, this species flowers abundantly in short-day conditions also (cf. Viirilä 1949).

Generally, in the summer months in Finland, plants tend to suffer severely from shortage of light only when growing in shady places. Shadows, especially, are only of importance in dense vegetation, and in gardens where the plants grow near trees or buildings. The influence of shading is illustrated, for example, by Pohjakallio (1952a). The increase of blast in oats (a form of sterility where white, empty glumes occur), when the plants are shaded, has been proved experimentally (Pohjakallio, 1935). However, in normal field conditions, the heavy incidence of blast on shaded adventitious panicles is also due to lack of mineral nutrients and to drought (Pohjakallio and Grundström, 1941). In the garden, the effect of tree-shade was most injurious to the growth of cucumbers and beans (Pohjakallio, 1955b), that is, plant species whose temperature requirements are relatively high. The effect of the shade of the same trees on the tuber yield of potatoes was relatively

*One crop unit corresponds to 1 kg. of wheat, rye, barley, and peas ; 1.2 kg. of oats ; 5 kg. of potatoes ; 2.2–2.5 kg. of hay ; 3.5–5 kg. of straw ; etc. (Westermarck, 1954).

small. Furthermore, in experiments in which the temperature was not linked with the light intensity (Pohjakallio, 1951c), the energy economy of the potato plant appeared to be relatively less dependent on the variations of the light intensity, as compared with that of timothy and the spring cereals. Corresponding differences have appeared between some other cultivated plant species, too. This, however, seems to depend, at least in part, upon differences in the accommodation of the different plant species to certain substrata and other growth conditions (Pohjakallio, 1954).

According to Rudorf (1934, 1938–9), the photoperiodic response of long-day plants cultivated in conditions of an extremely long summer day is relatively slight, because the rapid development, when it is caused by the photoperiodic stimulus, leads to scantiness of yield. In Finland, too, the photoperiodic response of the earliest spring cereal (barley) varieties is relatively slight (Pohjakallio and Salonen, 1947) ; however, the late-ripening varieties most affected by the long day are the most productive. In experiments on oats in Finland, a decrease of one day in the time between sowing and ripening led to a decrease of 1·33% in the yield relative to that of Goldrain oat (Pohjakallio, 1945a). In spite of this, farmers, impelled by the fact that the vegetative season is short, grow varieties which mature early, or develop rapidly (cf. Pesola, 1940 ; Paatela, 1953).

When a long-day plant grows in short-day conditions, its development is very slow, but as a result of the longer growing season, its vegetative growth is relatively luxuriant. According to investigations carried out by the Department of Plant Pathology, Helsinki University (Pohjakallio, 1948), however, short-day treatment greatly retarded the development of the lettuce. By contrast, in these experiments, radishes, when grown outdoors, developed flowers so early that they hardly formed roots of good quality at all (the roots were dry and hard), whereas, when grown in a 10-hr. photoperiod, the quality of the roots was excellent.

The luxuriant growth of the short-day plants manifests itself still more obviously in long-day conditions. For example, the soyabean from Virginia grows into a twining plant more than 4 m. tall (Pohjakallio, 1945, 1954). Correspondingly, the long day delays the maturing and withering of the haulms of the potato plant, and thus increases its dry-matter yield (Pohjakallio, 1954).

THE OVERWINTERING OF PLANTS

In the summer months proper, the light climate of Finland does not afford any essential advantages for the cultivation of plants but in the autumn, the light conditions are so unfavourable that the plants tend to suffer from lack of light.

In some experiments carried out by the Department of Plant Pathology, Helsinki University, it was found that in the assimilation process some compound is produced which is able to prevent the growth of certain parasitic fungi, for example the clover-rot fungus (*Sclerotinia trifoliorum*) (Pohjakallio, 1947; Pohjakallio *et al.*, 1951). Recently Virtanen *et al.* (1955, 1956) obtained and partially isolated some substances from rye, winter wheat, winter turnip-rape, meadow fescue and timothy, which are able to inhibit the growth of both the snow mould (*Fusarium nivale*) and the clover-rot fungus. The plants are able to form these substances only when exposed to light. Thus the lack of light in autumn, and under the thick snow cover during the long winter, weakens the resistance of plants against these parasites, which in Finland, and in Lapland especially, constitute the greatest danger to wintering plants.

It is true that the short day in autumn plays an important role in the process of hardening certain plants against the cold and other physiogenic factors of winter. In Finland, however, the autumn is relatively short ; in Lapland the summer almost immediately turns into winter (Pohjakallio and Salonen, 1956). Thus the short day hardly has time to affect the hardening of the plants there. In field experiments (Pohjakallio, 1951d), the wintering of red clover and alsike clover was substantially improved by reducing the normal day-length to 10 hr. ; in this respect the effect of the long day manifests itself equally strongly in South and in North Finland.

THE DROUGHT RESISTANCE OF PLANTS

Under natural conditions, the effects of light, temperature and moisture are so closely linked with one another, that it is often very difficult to draw conclusions as to the part played by light in the total effect of climate on plants (Pohjakallio, 1955b). During long dry periods, the effect of abundance of light cannot manifest itself on the plants because lack of water usually becomes the factor limiting growth. Besides, the ill-effects of drought appear to be especially marked in conditions of continuous light, because it is then that the plants transpire most effectively, since transpiration takes place mainly through the stomata, which open in light (Heath and Russell, 1953). For example, in the summer of 1953, at Muddusniemi Experimental Farm in Lapland, the effect of a two-weeks' drought proved disastrous and the hay crop was only one-tenth of normal (Pohjakallio and Salonen, 1956).

Consequently, in sunny summers, the yields of cultivated plants are by no means at their highest in Finland. The yields of spring-cereal varieties have been highest when the temperature between sowing and earing, i.e. at the time of the best assimilation period, was relatively low—

12°C. only (Pohjakallio, 1943) ; this means that in those summers cloudiness was greater, and hence the light intensity lower, than normal.

As Roberts and Struckmeyer (1948) pointed out, the root system usually decreases perceptibly when plants attain the reproductive stage. The lengthening of the diurnal photoperiod accelerates the rapidity of development of long-day plants, and thus the long photoperiod generally has an adverse effect on the root-top ratio of spring cereals (Pohjakallio, 1951c). High light-intensity also accelerates the rapidity of development of these plants (Pohjakallio, 1951a, 1952c) ; however, its effect on the root-top ratio (Pohjakallio, 1951c, 1952a, b, 1954) and on the amount of organic root-reserves (Møller-Nielsen and Lysgaard, 1956) has proved favourable.

The development of winter cereals and perennial herbage plants is very slow in their first growing season. At that time neither high light-intensity nor long photoperiod appreciably accelerate the rapidity of development of these plants. Probably on this account, not only an increase in light intensity but also a lengthening of the diurnal photoperiod is capable of increasing the root-top ratio (Pohjakallio, 1954).

According to Nerling (1933) and Feistrizer (1934), the rapidity of development of late spring-cereal varieties, is also somewhat dependent on the vernalizing effect of low temperatures, but the development of the earliest spring-cereal varieties does not depend on vernalization. Correspondingly, in experiments in Finland, the effect of day-length on the root-top ratio of the late spring-cereals has proved to be, during a short period after emergence, of the same nature as on that of the winter cereals and perennial herbage plants, whilst, on the other hand, a lengthening of the diurnal photoperiod has, without exception, reduced the root-top ratio of the earliest spring-cereal varieties (Pohjakallio, 1954).

These differences are, perhaps, not without importance in agriculture. The late spring-cereal varieties with root systems that do not decrease during the first part of the summer season, when precipitation is generally scanty (Keränen, 1938), do not suffer from drought as badly as the early varieties (Pohjakallio, 1945c). The long day in no way lessens the ability of winter cereals and herbage plants to obtain water from the deeper layers of the soil during their first summer.

DIFFERENT CROPS

General

Although the total amount of light, even in the middle of summer, is lower in Finland than, for example, in Central European latitudes, this apparently has hardly any appreciable effect on the growth of cultivated plants during the months of May–August (Pohjakallio, 1952d). To some extent the long day of the northern regions may be responsible for this. According to experiments carried out in Lapland (Pohjakallio, 1951c, 1954), some plant species, at least, may be able to assimilate throughout the day and night, and, obviously, the thermodynamically useful effect of the light energy is relatively high when the light intensity is somewhat reduced. The averaged dry-matter yields (shoots and roots) of *Phleum pratense*, *Festuca pratensis*, *Trifolium pratense* and *T. hybridum* gave relative values of 100, 200 and 294, with diurnal light periods of 10, 17 and 24 hr., respectively. Thus, with these plants, the rate of dry-matter production per unit of time reached its maximum between the 10th and 17th hr. of the light period, and, from the 17th to the 24th hr. of the night period, it was a little higher than in the first period of 10 hr. Thus, in the assimilation process of herbage plants, the long day may largely compensate for the lower total amount of light in Finland. Considering the energy economy of the shoots (tops) alone, the effect of the night light manifested itself positively in all the plants investigated. However, in experiments carried out with spring cereals, no effect of the night light on the total energy economy (shoots + roots) has been established, and the rate of dry-matter production has been most intense at the beginning of the light period (Pohjakallio, 1951c). Thus, in this respect, the spring cereals differ from the herbage plants investigated.

Cereals

In general, cereals are not able to ripen in North Lapland (Pohjakallio, 1951a) and thus the effect of the continuous day is not great enough to enable the limit of cultivation of cereals to be extended very far to the north (cf. Pohjakallio, 1951a). However, winter rye and early barley varieties are cultivated a little north of the 67th latitude (Parvela, 1930 ; Valle, 1952 ; Westermarck, 1954). According to Valle (1952), the northern limit of general cultivation of spring wheat and oats coincides roughly with the 66th latitude.

Potatoes

These are cultivated throughout Finland as far as the 70th latitude, and, in favourable years, their yield per ha. is greater in Lapland than anywhere else in Finland (cf. Hustich, 1940 ; Westermarck, 1954). The assumption is often expressed that the high potato yields in Lapland are due to the extraordinary character of the light climate, and especially to the continuous summer day prevailing there (Hustich, 1944). It is true that the light-intensity requirements of the potato plant seem to be relatively modest (Pohjakallio, 1951c, 1955b) and, consequently, it is able to utilize the night light of the northern regions for its

assimilation. However, the main growth of the potato plant in Lapland does not occur until so late in summer that the day is no longer continuous (Pohjakallio, 1953a). On the other hand, the onset of tuber formation is delayed by the long day.

The long day only slightly delays the onset of tuber formation in early potato varieties (Pohjakallio, 1953a). Late varieties are especially late in Finland because the long day considerably delays the start of tuber formation (Pohjakallio, 1955a), although, once this has begun, the long day has a favourable effect on yield. Moreover, this effect on yield manifests itself most clearly in those varieties in which the onset of tuber formation has been most delayed by the long day. For, once tubers have begun to form, their yield is primarily determined by the energy economy of the plant. This, again, depends on the amount of light, on the area of the assimilating surface of the plant, and also on the survival of its haulms, i.e., on factors on which the long photoperiod has a favourable effect. For example, the long day delays the maturing and withering of the tops (Pohjakallio, 1953a), and this means their assimilation period is lengthened. Moreover, the long day delays potato-blight infection of the tops (Pohjakallio, 1955a). In Finnish conditions potato blight regularly appears on the haulms earlier in early potato varieties than in late ones (Pohjakallio, 1953b). On the other hand, it does not appear at all in North Lapland, where the development of the potato plant is slow (Pohjakallio, 1953a). The general tendency in Finland is to cultivate the latest potato varieties possible (cf. Saksa, 1953).

The dry-matter content of the tubers is also affected by the long day (Pohjakallio, 1953a) ; there is not time in Finland for the starch content of the tubers of late varieties to reach its highest level. Just as the long day delays the development of the whole potato plant, so it is the most important reason (cf. Pohjakallio, 1953a) for the fact that in Finland the starch content of the tubers is generally lower than in Central Europe (Tuorila, 1929). It is also lower in Lapland than in South Finland (Pohjakallio, 1953a). From the foregoing it will be seen that it is not primarily the continuous summer day that is responsible for high potato yields in Lapland. It seems to be of greater importance that the most dangerous potato diseases, the viruses and blight, are lacking there (Pohjakallio, 1953a).

Herbage plants

These are widely cultivated in Finland. Their main growth takes place when the days are longest and the light intensity highest. In addition, other circumstances are relatively favourable (cf. Pohjakallio and Salonen, 1956). Thus, at present, rather more than half the arable land area is under grass (Valle, 1952 ; Westermarck, 1954) ; in Lapland nearly 80% is under grass (cf. Pohjakallio, 1956).

CONCLUSION

Our knowledge of the relationship suggested in the title is, at present, incomplete. However, our understanding of the effects on crop growth of the light climate in Finland, and of the continuous summer day prevailing in Lapland, is changing from speculative supposition to facts based on experimental investigations. The continuous day in Lapland does not compensate for the shortness of the growth period relative to that in South Finland, either in the energy economy or in the rate of development of cultivated plants. However, as regards the effects of the light climate, differences have been established between the different plant species and varieties cultivated in Finland.

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FIELD CROPS

CEREALS

WHEAT

371 Boerger, A. Enfoque de aspectos actuales de nuestro problema triguero. [**Present aspects of our wheat problem (in Uruguay).**] 1955, pp. 24, illus., Montevideo ; Inst. Fitotec. La Estanzuela.

372 Eliasson, S. Höstsädens såningstid. I. Sammanställning av resultat av kombinerade sort- och såtidsförsök med höstvete under åren 1942–1951. [**The time for sowing winter cereals. I. The results of combined variety and sowing-time experiments with winter wheat during the years 1942-51.**] *Medd. 51 Stat. Jordbr-Försök* 1955, 5–27, bibl. 28, English summary.

The experiments, altogether 135, were conducted in South and Middle Sweden. Three sowing times were tested in each experiment, their dates ranging from 8 August to 10 October according to region. On an average, in each region, the first sowing-time produced the highest grain yield, the second a yield about 2% lower, and the third a yield 13% lower than the first sowing. There was a fairly considerable increase in the amount of lodged straw from early to late sowing, an increase more evident in Middle than in South Sweden. Grain quality was little affected by retardation of sowing, although somewhat lower hectolitre-weight and thousand-grain weight, especially in the more northerly regions, but somewhat higher crude-protein content, were produced by the latest sowing-time. The earliest sowing-time gave the best results on sandy soil. The influence of different preceding crops was not great, although the harvest was least affected by the time of sowing when the wheat was sown into a broken ley. Sowing dates found desirable for the different regions studied are listed. They range from 25 August to 30 September, and are earlier for cold than for warm areas but should be relatively later where considerable attacks by snow mould are feared. Of the varieties tested, Skandia III B, Eroica I and Virtus gave the best results from early sowing. Ergo I appeared especially sensitive to too early sowing. Odin seemed especially suitable when sowing was delayed. The view that hardy varieties are better able to stand delayed sowing than less hardy ones was not confirmed. Differences in varietal resistance to parasitic fungi, snow mould in particular, are probably the main cause of differences in the ability of varieties to tolerate early or late sowing.—G.M.R.

373 Laude, H. H. and Pauli, A. W. **Influence of lodging on yield and other characters in winter wheat.** *Agron. J.* 1956, **48**, No. 10, 452–5, bibl. 10, illus. [Kansas Agric. Exp. Sta., Manhattan]

Plots of winter wheat were manually injured to simulate lodging at intervals before and after heading in order to investigate the losses resulting from the restricted capacity of lodged plants to absorb nutrients or to synthesize materials and store them in the grain. Yield losses per acre were less after injuries made about 5 days before heading than after earlier or later injuries. Losses in yield per acre progressively decreased following injuries after the mid-fruiting period. Decrease in number of kernels was a relatively more important factor in loss of yield than decrease in their size when lodging occurred prior to, during, and within a few days after heading. Lodging 1 week or more after heading affected the size of kernels relatively more than their number, and, during the latter part of the fruiting period, size of kernel was the dominant factor. The protein % was higher in grain from lodged wheat, but the total amount of protein per acre was less.—G.M.W.

374 Allen, G. H. and George, R. W. **Wheat investigations at Biloela Regional Experiment Station, Central Queensland.** *Qd J. agric. Sci.* 1956, **13**, No. 1, 19–46, bibl. 4, illus.

A review of climatic conditions is given to show the relationship between the distribution of rainfall and the production of wheat in the Callide Valley region. The utilization of conserved moisture and rainfall by wheat, during 1948–51, was studied, and tables are presented to show the moisture loss from the soil at different depths during the cropping season. The effect of water availability on plant behaviour is also noted. Sowing-time, the suitability of varieties for grain production and the influence of soil-N supply and frosts upon wheat production in the area are discussed.—From authors' summary.

375 Woodruff, N. P. **Wind-blown soil abrasive injuries to winter wheat plants.** *Agron. J.* 1956, **48**, No. 11, 499–504, bibl. 8, illus. [Kansas Agric. Exp. Sta., Manhattan]

376 Maĭsurjan, N. A. [**Desiccation of growing plants.**] [Russian] *Zemledelie (Agriculture, USSR)* 1956, **4**, No. 6, 80–3, bibl. 4. [Timirjazev Agric. Acad. Moscow]

In many regions of the USSR, particularly in the north, harvested grain has a moisture content

exceeding 17%, and requires further drying. In preliminary experiments, infusions of $CaCN_2$ (150 ml. in 1 l.) and 2% solutions of $NaClO_3$ and $Mg(ClO_3)_2$ were sprayed on growing plants at the rate of 400–500 ml. per sq.m. For the first experiment, in triplicate, winter wheat was used. Spraying was done on 28 July at the beginning of wax ripeness (29% water). After 5 days the moisture percentages of control and treated plants were 22·9 and 16·5–18·9, respectively, and after 10 days, 17·2 and 12·6–14·1. Only $NaClO_3$ caused a reduction in yield ; $Mg(ClO_3)_2$ caused an increase. In a similar experiment on spring wheat, spraying was conducted on 4 August (52% water). The moisture percentages of controls and treated plants were 38·6 and 26·4–33·5%, respectively, after 3 days, 30·5 and 17·9–20·9 after 6 days and 24·7 and 11·6–13·4 after 9 days. After 16 days the control grain still contained>16% moisture. [See also *Herb. Abstr.* 26 : 44].—J.F.C.

377 Oehler, E. and others. L'hiver 1955–1956. Ses douloureuses conséquences pour les cultures de Suisse romande. II. Céréales. [**The winter of 1955-6. Its grievous consequences on crops in French Switzerland. 2. Cereals.**] *Rev. rom. Agric.* 1956, **12**, No. 11, 96–100, bibl. 2, illus. [Stat. Féd. Essais Agric., Lausanne]

In April, 1956, a census was taken of winter sowings destroyed by the February frost. In Switzerland as a whole, 63% of the winter cereal crop was destroyed, and wheat suffered most. In French Switzerland, damage was most severe in those cantons (Vaud, Neuchâtel and Fribourg) where there was no snow covering. This confirms the findings of Vandenplas in Belgium (*Fld Crop Abstr.* 9 : 1061). Observations were made on the frost resistance of strains in the world collection of wheats at Mont-Calme (Canton Vaud). Of the 96 varieties of Swiss origin, only Unter-Engadin 9, Münstertaler, and Mont-Calme XIV had good frost resistance. The generic hybrid, wheat × rye, was highly frost resistant.—D.B.

378 Drover, D. P. **The influence of various rotations on coarse-textured soils at Chapman and Wongan Hills Research Stations, Western Australia. 1. Nitrogen and organic-carbon contents of the soils.** *J. Soil Sci.* 1956, **7**, No. 2, 219–25, bibl. 16. [Inst. Agric., Univ. W. Aust., Nedlands]

The effect of 4 wheat rotations on soil organic C and N in 2 long-term experiments is discussed. The experiments compare continuous wheat, fallow/wheat, fallow/wheat/pasture and fallow/wheat/2 years' lupins. On the assumption that adjacent uncultivated soils were comparable in C and N to the original virgin soils, the 4-course rotation is at each site the only one which maintains soil N at levels approaching those of virgin soils. The 2- and 3-course rotations produced serious losses in both C and N in both localities. The soil-N data support the hypothesis of Shiel and Cullinane that these levels are influencing wheat yield and the flour quality of the grain. The data emphasize, also, the very low N- and C-contents of these soils both in the virgin condition and after 22 years of a 4-course rotation in which half of each 4-year period was occupied by a leguminous crop. It is concluded that much longer periods under legumes are necessary to raise the N- and C-levels to those of highly fertile soils elsewhere.—From author's summary.

379 De Caestecker, K. and De Leenheer, L. Diminution de la fertilité sous l'influence de la détérioration de la structure. [**Decrease in soil fertility under the influence of structure deterioration.**] *Rapp. Congrès int. Sci. du Sol, Vol. B.* Paris, 1956, 57–62, bibl. 4, English and German summaries.

The clay soils of the polder region of Belgium are often affected by structure deterioration. In a trial described, wheat was grown on 18 plots in each of which there were areas having good or bad soil structure. Germination was 44% lower, on average, in the areas with poor structure than in those with good structure, but this difference was compensated for by tillering which was almost double in the areas with poor structure. The foliar factor (a measure of the active green area of young plants) was about 21% lower in the areas with poor structure than in those with good structure at end-May, but only 12% lower 2 weeks later. The yields per area were 50% higher, on average, in the areas with good structure than in those with poor structure, but the differences in yield per spike were considerably less between the 2 types of soil.—E.B.O.

380 Daniel, H. A. **Cropping systems and tillage methods for moisture conservation and wheat production [in Oklahoma].** *Proc. Okla. Acad. Sci.* 1954, **35**, 164–5. [Received Oct., 1956]

381 Schönbeck, F. Untersuchungen über Vorkommen und Bedeutung von Hemmstoffen in Getreiderückständen innerhalb der Fruchtfolge. [**Investigations into the occurrence and importance in the crop rotation of inhibiting substances in cereal residues.**] *Z. PflKrankh.* 1956, **63**, No. 9, 513–45, bibl. 43, illus., English summary. [Koln-Merheim]

The characteristics of the various inhibitory substances detected in soil and crop residues and the

actors affecting the concentration of the inibitors are discussed. It was found that cold-water xtracts of cereal straw inhibited the germination f cereals, particularly barley, and other seeds. Root growth of wheat seedlings was depressed by vater extracts of cereal-straw and -roots. The ddition of 0·15% straw to the soil depressed the oot growth of young wheat by 23%. Inhibitory ubstances were found to be present in greater uantity under the rows of stubble than between hem, but the difference disappeared within a nonth of harvesting the cereal crop.—M.P.

382 Morris, G. P. **Descriptions of recommended wheat varieties.** *J. nat. Inst. agric. Bot.* 1956, **7**, No. 3, 486–94, bibl. 3, illus.

The varieties are Banco, N. 59, Peko and Svenno. —M.P.

383 Burrell, W. D. **Winter wheat variety trials : 1950-54. (Bersee control) 1950-54 and (Juliana control) 1950-53.** *J. nat. Inst. agric. Bot.* 1956, **7**, No. 3, 495-509, bibl. 8.

Seventy-four trials of 13 early-maturing varieties f winter wheat, against Bersee as control, and 44 rials of later-maturing varieties against Juliana s control are reported. Details of yield, disease esistance, length of straw, resistance to lodging nd maturity are given. Cappelle Desprez and Minister had shorter straw, were more resistant to odging and gave higher yields than Bersee. Glasnevin Rosa had longer straw, but stood better han Bersee and gave higher yields. Demeter and Eclipse were shorter in the straw, stood better and ave yields sufficiently above those of Juliana to uggest that they would have outyielded Bersee. Alpha gave relatively higher yields in the north. —Author's summary.

384 Bullen, E. R. and others. **N.A.A.S./ N.I.A.B. trials of winter wheat varieties : 1953-54.** *J. nat. Inst. agric. Bot.* 1956, **7**, No. 3, 510–24, bibl. 3.

This report presents information derived from 59 ials carried out on 29 varieties of winter wheat sing Bersee as a control, and the results are disussed in the light of the report on trials carried ut from 1949 to 1952 [See *Fld Crop Abstr.* 9 :12]. Observations were made on the field characters f the varieties tested ; tables record for each ial the field conditions, the actual yields of ersee and the yields of the other varieties as a ercentage of the control. Marked differences in eld were recorded between the main types of heat.—From authors' summary.

385 Hoeser, K. Ergebnis der Prüfung von Winterweizensorten in den bayerischen Landessortenversuchen des Jahres 1955 und im mehrjärhigen Durchschnitt der Jahre 1950–1955. [**Results of trials with winter-wheat varieties in Bavaria in 1955 and some 1950-5 averages.**] *Bayer. landw. Jahrb.* 1956, **33**, No. 3, 293–318, illus. [Landessaatzuchtanstalt Weihenstephan, Bavaria]

The cultivation- and baking-qualities of 15 winter-wheat varieties on good and on medium-poor land in Bavaria and in the Bavarian Forest are tabulated.—D.B.

386 López-Ríoboo T., F. and others. Registro de variedades de plantas. Ensayos comparativos de variedades de trigo. [**Register of plant varieties. Comparative trials with wheat varieties.**] *An. Inst. nac. Invest. agron.* 1955, **4**, No. 2, 187–401, bibl. in text, illus.

As a result of trials carried out in 1953–4 in various Spanish regions, a number of wheat varieties is recommended for inclusion in the Official Catalogue of Varieties. A few barley varieties are also given.—E.B.O.

387 Téllez, R. Ensayos comparativos de rendimiento de trigos hibridos. (1953–54). [**Comparative yield-trials with hybrid wheat varieties 1953-4 (in Spain).**] *An. Inst. nac. Invest. agron.* 1955, **4**, No. 3, 615–51. [Cent. Cerealicult., Madrid]

[See also *Fld Crop Abstr.* 8 : 1173.]

388 Gadea, M. Sexto año de experiencias con nuevas variedades de trigo. [**Sixth year of experiments with new varieties of wheat (in Spain).**] *An. Inst. nac. Invest. agron.* 1955, **4**, No. 3, 569–613. [Cent. Cerealicult., Madrid]

[See also *Fld Crop Abstr.* 8 : 1172.]

389 Quagliotti, F. **Dragone.** *Sementi elette* 1956, **2**, No. 7, 59, illus.

A description is given of Dragone, a new Italian variety of soft wheat.—E.B.O.

390 Albo, G. Il grano ramoso ibleo e le sue forme. [***Triticum ramosum var. hyblaeum* and its types.**] *Nuovo G. bot. ital.* 1953, **60**, No. 3, 604–14, bibl. in text, illus., English summary. [Received Dec., 1956]

The name *T. ramosum* var. *hyblaeum* is proposed for a branched wheat variety found in Sicily.—E.B.O.

391 Sen, S. and Pal, B. P. **Adaptability of some recently evolved new Pusa wheats.** *Indian J. Genet.* 1955, **15**, No. 2,

112–35, illus. [Indian Agric. Res. Inst., New Delhi]

As a result of trials with wheats of the "NP" series carried out at a number of centres in several States (the local wheat being used as control), it was possible to make the following recommendations: No. 710 for Uttar Pradesh, Madhya Bharat, West Bengal and parts of Bombay; No. 715 for parts of Bombay; No. 718 for Delhi, South-east Punjab, southern Bihar, Rajasthan and Ajmer; No. 758 for Rajasthan and Madhya Pradesh; No. 760 for parts of Madhya Bharat and No. 761 for Bihar, especially the north.—D.B.

392 Copp, L. G. L. and Lobb, W. R. **Arawa, a new wheat to replace Dreadnought.** *N.Z. J. Agric*, 1956, **93**, No. 3, 221–5, illus.

In Canterbury and North Otago, Dreadnought is superior to other varieties in yield but cannot be directly headed. Arawa matures 2–3 weeks earlier, can be directly headed, is almost equal in yield and is more resistant to shattering and lodging. High yields can still be obtained after heavy grazing. The grain is of superior baking quality.—J.F.C.

393 Ufer, M. Studien an afghanischen Weizen. **[Studies on Afghanistan wheats.]** *Z. Pflzücht.* 1956, **36**, No. 2, 133–52, bibl. 5, illus.

The paper considers the botanical status of the local wheats in Afghanistan, their distribution in various parts of the country and their physiological characters.—D.B.

394 Hardesty, B. and Elliott, F. C. **Differential post-ripening effects among seeds from the same parental wheat spike.** *Agron. J.* 1956, **48**, No. 9, 406–9, bibl. 7, illus. [Washington Agric. Exp. Sta., Pullman]

Seeds from wheat varieties germinated for 96 hr. immediately after harvest demonstrated appreciable differences in primary-root length. Differences in primary-root length and percentage of germination were found to be related to the sequence of anthesis and maturation in florets of the parental spike. Florets that reach anthesis earlier (1st and 2nd florets from spikelets in the centre of the spike) were found to have the slowest rates of germination. Differences in primary-root length after 96 hr. of germination of seed from the selection Rio X Rex 41 tended to disappear during storage, and were essentially nil after 6 months of storage. The possibility of an active inhibiting or stimulating factor is discussed. [See also *Fld Crop Abstr.* 9 : 689].—Authors' summary.

395 Friesen, G. **Weed competition as affected by time of spraying.** *Proc. 2nd Ann. Meet. Canad. Soc. Agron.* 1956, B 1–5 [Univ. Manitoba]

Plots of wheat and of flax were grown, each in association with 10, 25, 50, 100, 200 and 400 mustard plants per sq. yd. Yields from these plots were compared with yields from weed-free plots. Half of each plot, including the weed-free plot, was sprayed for control of mustard and effect on crop yield. Results are tabulated showing yields of flax and of wheat when sprayed (in 1952 and 1953) with different quantities of 2,4-D ester and at different stages of crop plant development. In the flax plots, in both years, as few as 10 mustard plants per sq. yd. greatly reduced yield, therefore it pays to spray flax even when the infestation is very light; early sprayings (1–2 in. stage) prevented decreases in yield. In the wheat plots, at least 50 mustard plants per sq. yd. were required before significant reductions in yield were observed; in order that increased yields should offset the cost of spraying, the herbicide should be sprayed when wheat is at the early 4-leaf stage.—D.B.

396 Purdy, L. H. **Regional seed treatment tests for the control of seed-borne and soil-borne common smut of winter wheat in the Pacific Northwest for the year 1956.** *Pl. Dis. Reptr* 1956, **40**, No. 11, 996–1000. [Agric. Res. Serv., U.S.D.A.; Agric. Exp. Sta. Idaho, Montana, Oregon, Utah and Washington]

Tests on the control of smut (*Tilletia caries* and *T. foetida*) were conducted on Orin winter-wheat in Idaho, Oregon, Utah and Washington. The fungicides comprised 17 Hg-derivatives, 8 hexachlorobenzene (HCB) formulations and 75% pentachloronitrobenzene (PCNB). The rates employed were 0·25–2 oz./bu. Results were similar at all locations and good control of seed-borne smut was provided by all the materials tested. Only HCB and PCNB controlled soil-borne smut; 40% HCB at 1 oz./bu. gave good control, only slightly better results being obtained at the 2 oz. rate.—J.F.C.

397 Schuurman, J. J. and Goedewaagen, M. A. J. **Growth and root development of spring wheat on various loam profiles underlain by sand in relation to the fertilization of the subsoil.** *Congrès int. Sci. du Sol, Vol. D.* Paris, 1956, 325–34, French and German summaries.

The trial described was carried out with plants of spring wheat grown in concrete tubes in which a loam layer of different thickness (25, 50 or 75 cm.) was placed over sand. This was either unfertilized or treated with an NPK fertilizer. The soil water-level was kept at 90 cm. below soil

level. The fertilization of the subsoil raised the yields of grain and straw, and also the number of spikes per tube, over those of the unfertilized tubes. These increases were greatest in the loam 25 cm. deep. The total root weight was greater with unfertilized sand than with fertilized sand. This was caused by a greater development of the root system in the loam layer of the unfertilized profiles, especially in the upper 10 cm. of soil. In the fertilized profiles the quantity of roots in the subsoil was greater than in the unfertilized ones. —E.B.O.

398 Burström, H. **Temperature and root cell elongation.** *Physiol. Plant.* 1956, **9**, No. 4, 682–92, bibl. 17, illus. [Bot. Lab., Lund, Sweden]

The effect of temperature on root-cell elongation, cell-wall properties and the growth-regulating actions of Ca and coumarin on Eroica wheat were studied. With increasing temperature, the final cell length decreased owing to a shortened duration of the elongation, the cell-wall plasticity disappeared, the Ca-requirement increased and the roots became less sensitive to coumarin inhibition. Increase in temperature resembled an increase in active IAA. The interaction between IAA and Ca is discussed.—From author's summary.

399 Rufelt, H. and Fransson, P. **Differences in the auxin content of wheat roots caused by changes in the pH value of the nutrient solution.** *Physiol. Plant.* 1956, **9**, No. 4, 693–6, bibl. 11. [Bot. Lab., Lund, Sweden]

Wheat plants were kept at pH 5 for 3 days and then at pH 7·5 for 0·5 – 24 hr. An increase in the short-time extractable amount of IAA occurred after 1 hr., but was greatest at 6 hr. The original level of IAA was restored after 24 hr.—J.F.C.

400 Fujiwara, A. and Ojima, K. **Physiological studies of plant roots (1). Relations between concentrations of inorganic ions in medium and growth of isolated wheat roots.** [Japanese] *J. Sci. Soil, Japan* 1956, **27**, No. 4, 140–4, bibl. 21, illus., English summary. [Tôhoku Univ.]

401 Torssell, K. **Chemistry of arylboric acids. 6. Effects of arylboric acids on wheat roots and the role of boron in plants.** *Physiol. Plant.* 1956, **9**, No. 4, 652–64, bibl. 12, illus. [Inst. Org. Chem. and Biochem., Univ. Stockholm ; Bot. Lab., Univ. Lund, Sweden]

The acids were found to increase root growth very strongly by promoting cell elongation (by over 200%) but not cell division. Out of 24 acids tested, phenylboric and 4-methoxy-phenylboric acids were the most active. The hypothesis is advanced that at points in the cell wall where combination with boric or phenylboric acids occurs, the 'crystallization' of polysaccharide chains is hindered so that stiffening is delayed. Many symptoms of B-deficiency can be explained by this hypothesis.—J.F.C.

402 Pantos, G. Qualités physiologiques des espèces de bactéries dominant dans la rhizosphère du blé pendant les différentes périodes de développement de la plante et leur effet sur la plante. [**Physiological qualities of the principal species of bacteria in the wheat rhizosphere during the different periods of development of the plant and their effect on the plant.**] *Rapp. Congrès int. Sci. du Sol, Vol. C.* Paris, 1956, 237–41, bibl. 2, German and English summaries. [Lab. Rech. Biol. du Sol, Acad. Sci. Hongr., Sopron]

In a pot trial, wheat seeds inoculated with 4 species of bacteria were sown in sterile sand. The cultures developed well in the wheat rhizosphere. The bacteria had a favourable effect on wheat development as shown by the following weights of dry matter per plant following inoculation with the various species : *Bacterium agile* 12 g., *Pseudomonas radiobacter* 16·5 g., *Flavobacter solare* 14 g., *Bacterium parvulum* 14 g., compared with 10 g. in the control.—E.B.O.

403 Bradbury, Dorothy, and others. **Structure of the mature wheat kernel.** *Cereal Chem.* 1956, **33**, No. 6, 329–91, bibl. 128, illus.

This very comprehensive account is divided into 4 parts : gross anatomy and relationship of parts ; microscopic structure of the pericarp, seed coat and other coverings of the endosperm ; the endosperm ; the mature wheat kernel. Mature grains of Pawnee, a hard red winter-wheat, were used. Material and methods of histological study are described in detail.—J.F.C.

404 Zemljanuhin, A. A. [**Physiological changes in plants induced by the action of ascorbic acid.**] [Russian] *Fiziol. Rast. (Pl. Physiol., USSR)* 1956, **3**, No. 4, 313–18, bibl. 29, illus. [Voronež State Univ.]

It is known that the ripe seed of many plants contain practically no ascorbic acid. The author has found little vitamin C in wheat grain. In germinating wheat grain ascorbic acid is formed slowly, especially during the first 2–3 days. This paper is concerned with the effect on physiological processes of treating the grain of the spring wheat variety Hordeiforme 10 with ascorbic acid in a

water solution (concentrations 0·01 and 0·1%). The grain was immersed in the solutions (controls immersed in distilled water) and grown for 2 days on filter paper in Petri dishes containing the solutions. The cultures were then continued from 14 to 26 June with distilled water. One series was placed in light and a second in darkness. There is an indication that the most beneficial effect on accumulation of soluble sugars (especially saccharose) is produced by the weaker concentration of ascorbic acid (0·01%). The seedlings grown in the dark had very little saccharose and much less glucose compared with seedlings grown in the light. When grain was kept for 24 hr. in a solution of ascorbic acid, there was increase in respiration intensity with increase in ascorbic-acid concentration, e.g. from 0·255 mg. CO_2/1 g. crude wt./hr. at 0·01% concentration to 0·363 mg. CO_2 at 0·1% (compared with 0·245 mg. CO_2 in the control). In further tests made with *Helianthus annuus* var. VNIIMK 6540 the results obtained with wheat were confirmed. Tests made with *Pisum sativum* var. Ramonskiĭ-77 confirmed the observation made with *Helianthus* in regard to the effect of ascorbic acid in accelerating the accumulation and translocation of phosphorus in the plant. In addition, the experiments with *Pisum* have shown that the intensity of photosynthesis is increased by sprinkling the seedlings with a 0·01% solution of ascorbic acid (method recorded in *Proc. Acad. Sci. USSR*, 90, p. 913, 1953). The possibility of utilizing ascorbic acid in pre-sowing treatment of seed to improve crop yields is noted. —M.H.

405 EVERT, A. F. **[Concerning a method of studying ear-primordia.]** [Russian] *Fiziol. Rast. (Pl. Physiol., USSR)* 1956, **3**, No. 3, 287–9, English summary. [Inst. Pl. Husb., Acad. Agric. Sci., Leningrad]

A simple device is described which introduces some mechanization into the extraction of ear-primordia [of wheat], accelerates the work and improves its quality.—From author's summary.

406 NUTTONSON, M. Y. **Wheat-climate relationships and the use of phenology in ascertaining the thermal and photo-thermal requirements of wheat. Based on data of North America and of some thermally analogous areas of North America in the Soviet Union and in Finland.** *Amer. Inst. Crop Ecol.* 1955, pp. 388, bibl. 177, illus.

Extensive phenological data have been assembled to show the possibility of combining these with meteorological and day-length records in order to (a) disclose the thermal and photo-thermal requirements of both winter- and spring-wheat under uncontrolled field conditions, (b) to provide a means for a physiological-thermal classification or indexing of wheat varieties, and (c) to develop criteria for predicting dates of heading and maturity of wheat. The air-temperature base line found to be most suitable for summations of day-degrees was 40°F. The analyses showed that in predicting the maturity of winter wheat, day-degrees may be computed from 1 March, and that for spring wheat the date of sowing is as satisfactory as the date of emergence. The summations were made in both cases to ripening dates. Factors which caused variations in day-degree summations under otherwise equal conditions were increase in latitude, increase in elevation and differences in soil-moisture conditions. Numerical expressions of photo-thermal requirements were not affected to the same extent by these factors.—G.M.W.

407 OMAROV, D. S. **[The effect of autumn conditions on the content of soluble carbohydrates in spring wheat changed to a winter type.]** [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1956, **109**, No. 1, 217–20, bibl. 11. [All Union Inst. Pl. Industry]

Information on this subject is extremely fragmentary, although it is known that when spring cereals are changed to winter forms, their sugar content rises sharply after 2–3 years' overwintering (see, e.g., *Fld Crop Abstr.* 5 : 371). The dynamics of this feature, however, is obscure and the author's study of the spring wheat Milturum 321, carried out under Leningrad conditions, is designed to elucidate the facts. The data indicate that since a characteristic feature of winter cereals is the capacity to accumulate in autumn a considerable quantity of soluble carbohydrates, to achieve this there should be a tendency (in spring forms changing to winter types) for the vernalization phase to be prolonged.—M.H.

408 SINGH, R. M. **Effect of iron on leaf growth and chlorophyll content of wheat plants.** *Sci. and Cult.* 1956, **22**, No. 4, 229–31, bibl. 3. [Agron. Sect., B.R. Coll., Agra, India]

409 SCHLUMBERGER, O. Untersuchungen über das verschiedene Verhalten von Weizensorten gegen Lagerung. **[The different behaviour of wheat varieties in response to lodging.]** *Z. Acker- u. Pflbau* 1956, **102**, No. 1, 1–26, bibl. 17, illus.

This is a study of recovery from lodging and the factors which affect it. Ability to recover, a function of the node, depends on age and developmental stage of the stem and the weight of the ear and stem. Given similar weather conditions, all varieties tested were able to recover from lodging during ear emergence ; this ability fell off

gradually during flowering and ceased at the milk-ripe stage. During ear-emergence stage, the time interval between lodging and recovery was 2–5 days and during flowering 12–22 days. Long-stalked varieties tended to lodge more readily than short-stalked ones and heavy-eared varieties recovered with greater difficulty than lighter-eared varieties. Spring varieties of wheat were able to attain the erect position more rapidly than winter varieties. Varietal differences in the mechanical strength of internodes account for the different responses of varieties to hail damage. The brittleness of the ear axis was similar in all varieties examined. Steiners Roter Dinkel was the only variety which had a brittle ear axis at the milk-ripe stage.—D.B.

410 DADD, C. V. and BULLEN, E. R. **Nitrogen for wheat and barley.** *Agriculture, Lond.* 1956, **63**, No. 7, 312–5, bibl. 3. [NAAS, Eastern Province]

411 COÏC, Y. La nutrition et la fertilisation azotées du blé d'hiver. 1. Les besoins en azote du blé d'hiver. Conséquences agronomiques. [**The N-nutrition and -manuring of winter wheat. 1. The N requirement of winter wheat. Agronomic consequences.**] *Ann. Inst. nat. Rech. agron., Paris. Ser. A. Ann. agron.* 1956, **7**, No. 1, 115–31, bibl. 13, English, German and Russian summaries. [Sta. Phys. Vég., Versailles]

412 JOLIVET, M. E. Fertilisation azotée du blé d'hiver. 1. Influence, à dose égale, de la nature de l'engrais azoté épandu au tallage sur le peuplement et de celui apporté au tallage et à la montaison sur le rendement. 2. Utilisation à des fins différentes de l'azote épandu semi-tardivement sur deux variétés distinctes. [**Nitrogen manuring of winter wheat. 1. Influence, at equivalent doses, of the nature of the nitrogen fertilizer applied at tillering on stand and of that applied at tillering and at shooting on yield. 2. Utilization for different purposes, by two different varieties, of nitrogen applied medium-late.**] *C.R. Acad. Agric. Fr.* 1956, **42**, No. 9, 483–9.

In the field trials described, carried out at the agronomic station at Quimper, France, the wheat varieties used were Cappelle, which tillers well and is high-yielding, and Progress which tillers less and yields less than Cappelle. The main conclusions were that, in the case of wheat varieties of the Cappelle type, the use of nitrate at tillering is preferable to that of other types of N fertilizers, as they are quickly assimilated and give an optimum stand rapidly. In the case of varieties of the Progress type the ammonium fertilizers also give good results. These 2 types of N fertilizers are also equivalent when applied at shooting time (end of April), but Cappelle uses the N applied at this stage mainly for the formation of the spike and grain while Progress uses it mainly for straw formation. This is in agreement with the different vegetative behaviour of the 2 varieties after earing : Cappelle does not grow in height after this stage while Progress goes on growing until the distance between the base of the spike and the last leaf is about 40 cm.—E.B.O.

413 PRIMOST, E. Über den Einfluss hoher Stickstoffgaben auf die Qualität verschiedener Winterweizensorten. [**The effect of heavy applications of nitrogen on the quality of several varieties of winter wheat.**] *Z. PflErnähr. Düng.* 1956, **74**, No. 1, 42–59, bibl. 14, illus. [Landw. Versuchsstat. Steyr, Österreichische Stickstoffwerke A-G., Linz/Donau, Austria]

Staggered applications of up to 200 kg. N per ha. markedly increased the gluten content and improved the swelling properties of wheat while one, single, early application of N depressed the values of both these characters.—D.B.

414 SADAPHAL, M. N. and DAS, N. B. **Effect of spraying urea on wheat.** *Sci. and Cult.* 1956, **22**, No. 1, 38–40, bibl. 4. [Indian Agric. Res. Inst., New Delhi]

In a field trial in which wheat (*Triticum aestivum*) received a basal dressing of NPK, urea, at a concentration of 6%, sprayed 3 times during the reproductive stage, at 93 gal. per acre, produced the highest increase in protein content compared with concentrations ranging from 3 to 12%. In the absence of basal manuring, even a 1% concentration of urea resulted in a significant increase in protein content and yield of wheat. Spraying with urea increased the 1000-grain weight and resulted in a highly significant reduction in the percentage of mottled grain. The scorching of leaves which occurred, especially at the higher concentrations, was attributed to the high temperature at time of spraying.—D.B.

415 KAINDL, K. Untersuchungen über die Aufnahme von P^{32} markierten primärem Kaliumphosphat durch die Oberfläche von Weizenblättern. [**The intake through the surface of wheat leaves of potassium dihydrogen phosphate labelled with P^{32}.**] *Bodenkultur* 1956, **9**, No. 1, 43–9, bibl. 8, illus. [Österreichische Stickstoffewerke A.G., Linz/Donau, Austria]

Experiments were conducted to investigate the

connexion between dosage, stage of development of wheat plant, and nutrient intake by the leaf. Data are presented which indicate that the best effects on growth are to be expected when leaf spraying is carried out between the 4th and 8th week after sowing at the rate of 10^{-3} to 10^{-4} mg. KH_2PO_4 per plant.—D.B.

416 SADAPHAL, M. N. and DAS, N. B. **The effect of micro-element fertilizers on wheat.** *Sci. and Cult.* 1956, **22**, No. 4, 233–5, bibl. 9. [Ind. Agric. Res. Inst., New Delhi]

A 3-year field trial was carried out to study the comparative efficiency of micronutrients, when applied to the soil before sowing and when sprayed at heading, and their effect on the quality and yield of wheat (NP 710). Cu, Mn, Zn and Mg were applied as sulphates at 5, 10, 5 and 10 lb./ac., respectively, to the soil and each at 1 lb./ac. as a spray. All significantly increased the grain yield, Mn giving the highest response from soil application (NPK, NPKMn : 1428, 1861 lb. grain/ac.). Spray application of all except Mn significantly increased the grain yield, Mg giving the maximum increase (NPK, NPKMg : 1502, 1783). Yields were increased more by the spray application of Zn than by its application to the soil. Soil application of Zn and especially of Mn increased the protein content of the grain (NPK, NPKMn: 11·0, 11·9%). Spray application of all micronutrients except Mn increased the protein content of the grain, the maximum increase being with Zn (NPK, NPKZn : 11·0, 12·0%) ; the increase was greater when N, P and K were not applied.—J.F.C.

417 POOL, M. **The effect of the delay accompanying the use of the combine harvester in the physical and chemical properties of soft red winter wheat.** *Diss. Abstr.* 1956, **16**, No. 6, 1036–7. [Purdue Univ., Lafayette, Ind.]

418 O'CALLAGHAN, J. R. **Contra-flow drying of beds of wheat.** *J. Sci. Fd Agric.* 1956, **7**, No. 11, 721–8, bibl. 10, illus. [Mech. Engng Dep., Univ. Coll., Dublin]

Theoretical and experimental data are presented from which it has been concluded that the principle of contra-flow is suitable for air drying of wheat grain, particularly at low temperatures. A satisfactory drying curve can be devised during the transient stage in contra-flow by regarding the deep bed of wheat as a number of thin layers in series and assuming that the total heat of the drying air remains constant. The proposed semi-graphical solution can be used to design and analyse the performance of a contra-flow wheat drier.—M.P.

BUCKWHEAT

419 ŠUMKOVA, M. N. [**Narrow-rowed sowings of buckwheat as a means of increasing the crop yields.**] [Russian] *Zemledelie* (*Agriculture, USSR*) 1956, **4**, No. 5, 125–7. [Kazan State Sel. Sta., Tatar ASSR]

Buckwheat [*Fagopyrum esculentum*] was sown in 3 ways on experimental plots during 1948–55 : (a) 4·5 million seeds/ha. in rows 13–15 cm. apart ; (b) 2·5 million seeds/ha. in rows 40 cm. apart ; (c) 2·5 million seeds/ha. in rows 7–9 cm. apart. The yield from (c) exceeded that from (b) by 220–470 kg./ha. and that from (a) by 240–610 kg./ha. The average numbers of plants per sq. m. were 415, 223 and 237, respectively. The numbers of plants per metre-row in (b) and (c) were 89 and 24. The average number of branches per plant were 1·45, 1·75 and 3·3, respectively. In (b) 35% and in (c) 85% of plants had 3–5 first-order branches. The average number of panicles per plant were 4·4, 4·6 and 8·6 and the percentages of plants with 7 or more panicles were 6, 28 and 43, respectively. Average grain weights per plant were 0·62, 1·11 and 1·43 g. and percentages of plants with grain weights exceeding 1·2 g. were 14, 41 and 70. Second-order branching was lower in (c). Combine harvesting was facilitated in (c) because ripening of the main grain mass was 4–5 days earlier, the plants were taller and the fruits were situated higher on the plants. The superiority of method (c) has been confirmed in other institutes and farms in the Tatar ASSR. Favourable conditions for individual plant development were also provided by cross-sowing, which sometimes proved superior to all other methods. At the Alexandrov State Farm (Vladimir region) in 1955, yields from 4 million seeds/ha., from double-rowed sowing at 2–2·5 million, from narrow-rowed sowing at 2–2·5 million and from cross-sowing at 2–2·5 million, were, respectively, 4900, 5500, 6400 and 5300 kg./ha. It was concluded that narrow-rowed sowing was superior in yield and more economical. —J.F.G.

420 SUGAWARA, K. **Studies on the pollen of buckwheat. On the relation of its germination to temperature.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 264–5, illus., English summary. [Iwate Univ.]

Germination of the pollen tube was observed to take place between 18 and 30°C., the optimum being 20°C.—From author's summary.

421 MATERIKINA, E. I. [**Supplementary pollination of buckwheat.**] [Russian] *Zemledelie* (*Agriculture, USSR*) 1956, **4**, No. 5, 127.

Experimental and other data have shown the need to have beehives near or on the field to ensure high yields of buckwheat (*Fagopyrum esculentum*) in various districts. Near Kiev, for example, it was repeatedly found that removal of the hives from the field caused yields to decline, e.g. from 1600 kg. ha. to 1280 kg./ha. at 0·5 km. distance and to 640 kg. at 1·5 km. For good pollination, it was concluded that 2 beehives/ha. are required. To adapt them, the bees often need to be fed on syrup saturated with the odour of buckwheat flowers. In the absence of farm hives, the customary rope-technique [i.e. drawing a rope across the field to spread the pollen] is recommended.—J.F.C.

OATS

422 Grafius, J. E. **The relationship of stand to panicles per plant and per unit area in oats.** *Agron. J.* 1956, **48**, No. 10, 460–2, bibl. 4, illus. [Michigan State Univ., E. Lansing]

Two theorems for these relationships were developed and proved, and used as a basis for calculating the theoretical effect of variations in stand on the number of panicles. Most of the 40 oat varieties when grown at various stand densities compensated for the differences in stand by increasing or decreasing the number of panicles per plant.—G.M.W.

423† Southwell, B. L. and Parham, S. A. **Annual winter grazing in the coastal plain of Georgia.** *Mimeo. Ser. N.S. 13 Georgia Agric. Exp. Sta.* 1955, pp. 7.

Victorgrain, Arlington and Southland oat varieties and Abruzzi rye are recommended for winter grazing. Early land preparation conserves moisture for October sowing. Applications of 4–12–12 or 0–12–12 at 400–500 lb. per acre and at least 100 lb. N per acre are needed, followed by sowing of oats at 4 bu. per acre or rye at 2 bu. per acre. Oat and rye crops should be alternated to reduce disease. Beef cattle for fattening may have supplemental high-carbohydrate feeding, and for milk production rotation grazing should be practised. Crops grown for grain following grazing up to the end of February are improved by further applications of nitrogen.—G.M.W.

424 Mann, G. C. **Spring oat variety trials, 1952-55.** *J. nat. Inst. agric. Bot.* 1956, **7**, No. 3, 525–35, bibl. 4.

In the 48 trials of spring oats reported, the varieties compared were Altesse Jaune, Espoir de Gembloux, Libertas, Rex, Wodan and Sun II (control). Detailed information is given on the field behaviour of the varieties. No improvement over Sun II was shown by any variety in yield or quality of grain, although the performance of Rex was similar. They all appeared to be inferior in straw production. Libertas was 1 or 2 days earlier than Sun II while Wodan was at least 4 in. shorter in the straw and gave a suggestion of superior standing ability.—From author's summary.

425 Waterson, H. A. and Kent, N. L. **Yield and quality of spring oats in west of Scotland trials.** *J. nat. Inst. agric. Bot.* 1956, **7**, No. 3, 536–50, bibl. 6. [W. Scot. Agric. Coll., Auchincruive, Ayr, (H.A.W.); Res. Assoc. Brit. Flour-Millers, St. Albans, (N.L.K.)]

Yield and quality characteristics of grain and straw have been recorded for 11 varieties grown at a low-ground, high-fertility centre (Auchincruive) and for 9 varieties grown at a nearby upland, low-fertility centre (Cumnock). The varieties Blenda and Sun II were outstanding in yield and quality. Forward and Reagle were satisfactory at Auchincruive, and Albyn Donside, Ardee Potato, Yielder, R.30 and Ayr Line Potato at Cumnock. Milling quality, oil-, protein- and ash-content of the kernels are tabulated. Forward was significantly better than Onward in yield and quality.—From authors' summary.

426 Bain, R. and others. **Oat variety trials in North-East Scotland 1952-55.** *Scot. Agric.* 1956, **36**, No. 2, 75–81. [N. Scot. Coll. Agric.]

The recommendations for oat varieties in N.E. Scotland are based on resistance to lodging, dates of maturity, grain yields and kernel contents of the tested varieties, and are given in relation to the use of the crop and to the soil types viz. (1) lea oats or high fertility soil, (2) yaval or cross-crop oats or medium fertility, (3) clean-land oats or nurse crops and (4) oats for combine harvesting. The varieties recommended under these respective headings are (1) Sun II, Blenda, Ayr Commando and Abed Palu, (2) Forward, Onward, Reagle, Pajbjerg Rex, Marne and Express, (3) Ayr Commando, Forward and Lightning and (4) Forward, Onward and Lightning.—G.M.W.

427 Ministry of Agriculture Northern Ireland. **Reports from the counties. Oat variety trials.** *Mon. Rep. Minist. Agric. N. Ire.* 1956, **31**, No. 5, 140–1.

In respect of yield, the results in 1955 with low-land and high-land varieties were similar to those obtained in 1954. [See *Fld Crop Abstr.* 9 : 38]. Forward headed the low-land varieties with 32 and 36·25 cwt. of grain and straw per ac., respectively. Libertas, a new introduction, was similar in most respects to Marne and Steel, but ripened earlier than either variety.—M.P.

428 Buchli, M. Hafersorten-Anbauversuche 1953/55. [**Cultivation trials with oat varieties 1953-5.**] *Mitt. schweiz. Landw.* 1956, **4**, No. 7, 112–17. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon]

The following varieties are recommended for grain yield, resistance to frit-fly and early ripening: Flämingstreue, Carstens Gelbhafer VII and Firlbecks Gelbhafer II. Only Flämingstreue and Flämingsgold appear in the Swiss accredited cereal seed list for 1955/6.—D.B.

429 Brown, C. M. and others. **Spring oats for Illinois.** *Circ. 754 Illinois Agric. Exp. Sta.* 1956, pp. 16, illus.

Descriptions are given of spring oats, including 10 varieties recommended and 5 not recommended for Illinois, together with the average yields recorded at several localities.—M.H.F.

430 Darbre, A. and Norris, F. W. **Vitamins in germination. Determination of free and combined inositol in germinating oats.** *Biochem. J.* 1956, **64**, No. 3, 441–6, bibl. 24, illus. [Dep. Appl. Biochem., Univ. Birmingham, (A.D.); Dep. Physiol. and Biochem., King's Coll., Univ. London, (F.W.N.)]

431 Frey, K. J. and Wiggans, S. C. **Growth rates of oats from different test weight seed lots.** *Agron. J.* 1956, **48**, No. 11, 521–3, bibl. 6, illus. [Iowa State Coll., Ames]

In experiments using 4 oat varieties (Mo. 0–205, Cherokee, Branch and Clinton) each with 5 test weights ranging from 17–38 lb./bu. it was found that seed lots which ranged from 17–28 lb./bu. produced seedlings which initially weighed from 50–75% as much as those from seed lots weighing more than 30 lb./bu. In all but 2 cases these seedlings reached in 7–10 weeks the same dry weight as seedlings from high test-weight seed. —G.M.W.

432 Burt, E. O. **Chemical weed control in oats.** *Proc. 9th S. Weed Contr. Conf.* 1956, 80–5. [Florida Agric. Exp. Sta., Gainesville]

Oats were treated with 2,4-D (amine and ester) and MCPA (ester) at the 2–3, 3–4, and 5–6 leaf stages. The response, particularly to higher rates, was less at the late stage. Only 2 oz./ac. amino triazole or 0·5 lb./ac. dinoseb were tolerated at the 2nd stage, while 4 lb./ac. 2,3,5-TBA had very little effect at the 2nd or 3rd dates.—*Weed Abstr.* 5 : 1029.

433 Sand, P. F. and Shafer, N. E. **The effect of isooctyl ester of 2,4-D on eight varieties of oats.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 24–5. [Univ. Nebraska, Lincoln]

In 3 successive years, 8 varieties of oats (Nemaha, Kherson, Ajax, Andrew, Marion, Clinton, Kanota and Mo. 0–205) were sprayed at various growth-stages with 2,4-D (isooctyl ester) at 4 and 16 oz. per ac. The effects of the treatments in reducing the yields of the oat varieties are given.—G.M.W.

434 Waywell, C. G. **The effect of herbicidal treatments on oats.** *Proc. 9th Meet. E. Sect. Nat. Weed Cttee* 1955, 109–17, illus.

A detailed account is given of experiments carried out from 1953–5 to compare the effects of butyl esters and amines of 2,4-D and MCPA on oats (variety Beaver). Rates of application were: butyl esters 4, 6, 8 and 12 oz. a.e. per acre and amines 6, 8 and 12 oz. a.e. per acre. Results were grouped under deformities and yields. In 1954 the plots exhibiting the most pronounced abnormalities were those treated with 2,4-D (butyl ester) at 12 oz. per ac. The MCPA plots had few deformities for any formulation or rate. 2,4-D (butyl ester) at all rates also had the most depressing effect on yield. In 1955, results were in general similar and the data obtained from both years' experiments are tabulated.—From *Weed Abstr.* 5 : 1198.

435 Richards, R. F. **Field studies of the residual effects of several herbicides.** *Proc. 9th S. Weed Contr. Conf.* 1956, 154–60, bibl. 6. [Tennessee Agric. Exp. Sta., Knoxville]

The effects of 2,4,5-TP, dalapon, trichloropropionic acid, 2-chloro-4,6-bis(diethylamino)-S-triazine, (1 chloropropyl-2)-N-(3-methylphenyl) carbamate, CMU, 3,4-DDU and CIPC on a subsequent oat crop are recorded. The stand was practically unaffected by low rates of 2,4,5-TP, dalapon and trichloropropionic acid.—G.M.W.

436 Leukel, R. W. and Earhart, R. W. **Seed-treatment tests on winter oats and wheat in 1955-6.** *Pl. Dis. Reptr* 1956, **40**, No. 9, 785–7. [Agric. Res. Serv., U.S.D.A., Beltsville, Md, and Clemson Agric. Coll., S.C.]

Seed samples of Fultex oats, naturally infected with *Ustilago avenae* and partly with *U. kolleri*, were treated with 18 Hg-fungicides at 0·15–4·0 oz./bu. No fungicide appeared to improve emergence or stand counts but panogen PA2N at Beltsville and Clemson, and agrox at Clemson reduced emergence somewhat. Only 3 materials at Beltsville and 5 at Clemson failed to eliminate smut completely. Samples of Purplestraw wheat were treated similarly with the same fungicides. Ten of the fungicides completely eliminated bunt

(*Tilletia caries* and *T. foetida*) while the remaining 8 reduced it to 0·4% or less. At Beltsville, all of the fungicides eliminated bunt.—J.F.C.

437 GRAINGER, J. **The control of *Ditylenchus dipsaci* on oats.** *Nematologica* 1956, **1**, No. 4, 277–82, bibl. 6, illus. [Dep. Pl. Path., West Scotland Agric. Coll., Auchincruive, Ayr]

Tulip-root of oats, caused by this eelworm, was satisfactorily controlled by 40–50 gal./ac. of 0·1% $HgCl_2$, applied immediately after sowing from a suitable fan-jet sprayer followed by a surface-mixing device. Treatment, when given to lightly infested oats on fields previously severely infested, resulted in full yields, and, when given to severely infested fields, resulted in yield increases but not a full crop.—From author's summary.

438 PARRY, D. W. **The effects of 2 : 4-dichlorophenoxyacetic acid, 2 : 3 : 5-triiodobenzoic acid, and thiourea on the vegetative and reproductive growth of *Avena sativa*.** *J. exp. Bot.* 1956, **7**, No. 21, 381–6, bibl. 16, illus. [Univ. Coll. N. Wales, Bangor]

The effects of 2,4-D (sodium salt), 2,3,5-tri-iodobenzoic acid (TIBA), and thiourea on the growth of *Avena sativa* have been studied in relation to subsequent leaf development, tiller production, and apical growth of the seedlings. Treatments with 2,4-D and TIBA (concentration of each 500 mg./l.) depressed the emergence of each successive shooting leaf, but thiourea, at the concentration used (1000 mg./l.) proved to be lethal. Subsequent observations on the tillering capacity of the seedlings show that treatment with 2,4-D significantly increases the rate of tiller production, but that TIBA fails to do so. Longitudinal sections through the apices of the treated seedlings show that both treatments inhibited the development of the apex. 2,4-D inhibition is the greater. In the concentrations applied, neither treatment caused any obvious abnormalities in respect of mature leaves.—From author's summary.

439 BOKEN, Else. **The effect of ferrous sulphate on the yield and manganese uptake of oats on sandy soil fertilized with pyrolusite.** *Plant and Soil* 1956, **8**, No. 2, 160–9, bibl. 22. [Dep. Soil Fertil. and Pl. Nutr., Roy. Vet. Agric. Coll., Copenhagen]

[See also *Fld Crop. Abstr.* 9 : 1096]

440 GERRETSEN, F. C. Mangaangebrek bij haver in verband met fotosynthese. [**Manganese deficiency in oats in relation to photosynthesis.**] *Landbouwk. Tijdschr., Wageningen*, 1956, **68**, 9, 756–7, bibl. 8, illus., English summary.

Healthy and manganese-deficient leaves of oats were tested for photo-activity and CO_2-assimilation in order to determine the part played by manganese in photosynthesis. The CO_2-assimilation of the leaves of Mn-deficient plants was less than half that of normal plants. Photo-activity, measured in terms of the redox potential of suspensions of leaf material, was low in suspensions of Mn-deficient leaves but was restored to normal by the addition of Mn to the suspensions. The study was continued on several varieties of oats, some of which, on soils deficient in Mn, had shown resistance to diseases attributable to Mn deficiency. The resistant varieties, when grown in Mn-deficient media (water cultures or soil), showed a far greater ability to thrive than the non-resistant varieties. Furthermore the leaves of resistant varieties absorbed about twice as much CO_2 as the susceptible ones.—W.J.B.

441 VERGNANO, Ornella. L'azione fisiologica del nickel sulle piante di un terreno serpentinoso. Effetti di alte concentrazioni di nickel su alcune piante da cultura. [**The physiological action of nickel on the plants of a serpentine soil. Effects of high nickel concentrations on some crops.**] *Nuovo G. bot. ital.* 1953, 60, No. 1–2, 109–83 and 189–96, bibl. 72, illus., English summary. [Received Dec., 1956]

The investigations deal mainly with oats grown in Whitecairns area, Aberdeen. [See also *Fld. Crop Abstr.* 8 : 817.]—E.B.O.

RYE

442 LAUBE, H. A. Vergleichende Untersuchungen zur Entwicklungsphysiologie am Petkuser Normalstroh-Roggen (2n) und Petkuser Tetraroggen (4n). [**Comparative experiments on developmental physiology in Petkus normal-straw rye (2n) and Petkus tetra-rye (4n).**] *Z. Pflzücht.* 1956, **36**, No. 3, 305–62, bibl. 89, illus. [Saatzucht Klausheide F.v. Lochow-Petkus, G.m.b.H., Germany]

The differences in morphological and physiological characteristics between diploid and tetraploid winter-rye and the effects of temperature and light treatment on these characteristics were investigated.—D.B.

443 VIRTANEN, A. I. and HIETALA, P. K. **An anti-fungi factor in rye seedlings.** *Suom. Kemist. B.* 1955, **28**, 165–6, illus., bibl. 1. [Lab. Found. Chem. Res., Biochem. Inst., Helsinki, Finland]

The substance 2(3)-benzoxazolinone, isolated from rye seedlings, was found to inhibit strongly the

growth of snow mould (*Fusarium nivale*) and clover-rot fungus (*Sclerotinia trifoliorum*).—J.F.C.

444 TOMITA, T. **Effects of diffusate obtained from vernalized winter-rye seeds.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24,** No. 4, 260–1, bibl. 6, illus., English summary. [Tôhoku Univ.]

This diffusate accelerated heading in winter rye and the growth in length of the stem.—D.B.

445 LECHNER, L. Erntebergungsprobleme für den Saatgetreide-Erzeuger. [**Storage problems for the cereal-seed producer.**] *Bayer. landw. Jahrb.* 1956, **33,** No. 4, 407-30, illus. [Landessaatzuchtanstalt Weihenstephan, Bavaria, W. Germany]

The problems discussed are : the varietal characteristics of cereals suitable for combine harvesting ; the most favourable stage of maturity for cutting ; the effect of the threshing process on seed viability ; transport from field to storage ; and cleaning, storage, and drying of the grain. The seed viability of combine-threshed Tetraroggen (rye) of 9·9% moisture content was reduced from 98% (for hand-threshed) to 92% when speed of drum rotation was 1000 rev./min. and to 80% when the speed was 1500 rev./min. Visible damage to the grain increased from 5 to 28% when drum rotation increased from 1000 to 1500 rev./min. The decrease in viability due to increase in speed of drum rotation was accentuated as the moisture content of the grain fell below or rose above the optimum of 16%. This was particularly marked for moisture contents above 20%. Regarding storage, the paper describes ventilated containers and gives a list of apparatus, at present on the market, for the rapid determination of grain moisture content. The list gives the name of the apparatus, the principle on which it works, the manufacturer and price.—D.B.

BARLEY

446 PESSI, Y. **On the effect of rolling upon the barley and oat crop yield and upon the thermal conditions of cultivated peat land.** *Valt. Maatalousk. Julk.* 1956, No. 151, pp. 23, bibl. 11, illus. [Frost Res. Sta., Pelsonsuo, Finland]

A field rolling test was arranged at the above Station during the summer of 1955, with oats and barley as experimental plants. The test area was a sedge peat bog which had been cleared for cultivation 2 years before and which had a very loose cultivated layer. The test comprised plots treated with a Cambridge roller and a concrete roller, respectively, and an untreated plot, there being seven replicates of each treatment. Measurements were made of the soil and air temperatures. Rolling increased the grain and straw yields of oats and barley. The increase in barley grain yield was 160 and 184%, respectively, as compared with the untreated test plot ; with oats the increase was 29 and 32%. The corresponding figures for straw yield were 76 and 74, and 36 and 38%, respectively. However, the crops were unusual throughout in that the ratio between straw and grain yield exceeded 3 : 1 on all test plots. The straw yield achieved normal values, whereas the seed yields were lower than normal. Rolling increased the temperature of the cultivated layer in the early part of the summer, the highest temperature difference being 1·5°C. Similarly, the minimum air temperatures on the frosty nights of the early summer were higher on the treated plots. The main reason for the increased crop yield achieved by rolling is thought to be the fact that the roots of the plants gain closer contact with their nutrient layer when this layer has been compressed by the roller.—From author's summary.

447 HASEGAWA, S. and others. **Effects of irrigation at various times on the growth and yields of barley and wheat.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24,** No. 4, 307–9, illus., English summary. [Kanto-Tosan Agric. Exp. Sta.]

During a 5-year experiment, winter irrigation reduced, but spring irrigation increased, yields of wheat and barley. With wheat, the increase was much greater than with barley, being 10–20% above controls, whether the season was a wet or dry one. With barley, there was a marked increase in the drier years only. The number of tillers, culm length and 1000-grain weight contributed to the yield increase which resulted from spring irrigation. In winter, the amount of soil water present is adequate for the early- and mid-stages of growth of these crops. At this time of year irrigation may even retard growth because of the lowering of the soil-water temperature as a result of frost and subsequent thaw.—D.B.

448 ELLIOTT, C. S. and BURRELL, W. D. **Spring barley variety trials, 1948-53.** *J. nat. Inst. agric. Bot.* 1956, **7,** No. 3, 551–64, bibl. 6.

Eighty-two field trials of spring barleys, carried out during 1948–53, are reported. The main varieties included were Carlsberg, Gold, Herta, Lenta, Maythorpe, Proctor, Provost and Rika. Short comments are given on 8 other varieties and some unnamed selections. Proctor produced grain of good malting quality. Herta and Rika had the stiffest straw ; these 3 varieties also gave the highest yields. —From authors' summary.

449 MASON, H. J. and COX, A. E. **Malting**

barley from winter-sown spring varieties. *Agriculture, Lond.* 1956, **63,** No. 7, 315–8, bibl. 2.

450 Ministry of Agriculture Northern Ireland. **Reports from the counties. Barley variety trials.** *Mon. Rep. Minist. Agric. N. Ire.* 1956, **31,** No. 5, 141–2.

In trials at 10 centres during 1955, the average yields of Bonus, Carlsberg, Beorna, Proctor, Freja and Herta were 28, 27·75, 26·5, 26·25, 26 and 24·75 cwt. per ac., respectively.—M.P.

451 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Forsøg med bygsorter 1951–1954. [**Barley varietal trials, 1951-4.**] *Medd. 527 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1955, **59,** No. 2, 345–8.

The trials took place in 11 localities in Denmark on clay, sand, and marshland, the material comprising mostly Danish and Swedish barley varieties. Results are tabulated and a short description is given of each strain.—G.M.R.

452 Wilten, W. Opbrengsten, rassenstatistiek en raseigenschappen van zomergerst. **Yields, statistics and characters of barley varieties [in the Netherlands].** *Jaarb. NaCoBrouw.* 1956, 94–103, English summary.

Table 1 gives the grain yields of the most important varieties in 1955. In Table 2 a comparison is made of the grain yields of the most important varieties in the Southwestern clay district since 1948. Tables 3 and 4 give statistics about the area sown to each variety in each agricultural district and the percentages of the varieties sown in these districts. Out of the total area (66,000 ha.) of spring barley, more than 50% is grown in the Southwestern clay district, where the most important variety is Balder (71%), followed by Piroline (14%) and Kenia (9%). In the Central, as well as in the Northern clay district, there is a tendency to change from typical fodder-barleys to malting-barley varieties. Low yields of fodder barley and good prices for quality barley are considered to have been the main reason for this.—From author's summary.

453 European Brewery Convention. **Report of the Barley Committee. Trials 1955.** Rotterdam, 1956, pp. 114, illus.

This report gives the results of trials carried out in 13 West European countries. The barley varieties sown in all the trials were Kenia (standard), Busser, Carlsberg II, Domen and Proctor, with Beorna, Maythorpe, Weibull 5425 (renamed Ingrid) and Wisa in most countries. Carlsberg II was the best yielder in nearly all the countries, and its malting qualities were satisfactory. Proctor again did well. Domen gave good yields in England and the Scandinavian countries only, but it shows promise, in that it is completely free from dormancy, has a high malt extract, and is stiff-strawed. Busser has good malting qualities but poor agronomic features. Weibull 5425, though satisfactory agriculturally, had less satisfactory industrial characteristics. Beorna and Maythorpe were poor that year.—M.P.

454 Johnston, W. H. and Metcalfe, D. R. **The history, description and performance of Parkland—a new malting barley.** *Agric. Inst. Rev.* 1956, **11,** No. 5, 11–14 and 53, illus. [Canada Dep. Agric., Brandon, Man.]

The yields of standard malting varieties such as OAC.21 and Montcalm have shown a steady decline. The 6-rowed Manchurian-type, Parkland, has outyielded both varieties throughout Western Canada by 17 and 12%, respectively, and has shown exceptionally good adaptation to the eastern prairies. It excels in bushel weight, and in kernel weight is similar to Montcalm and only slightly higher than OAC.21. It shows a high resistance to local races of stem rust and in malting qualities is rated equal to OAC. 21.—I.F.C.

455 Rico, E. M. Perspectivas económicas del cultivo de cebada con variedades mejoradas. [**Economic prospects of growing improved barley varieties.**] *Agric. trop., Bogotá* 1956, **12,** No. 1, 19–21, bibl. 2.

Information is given on the agronomic and economic aspects in Colombia of the barley variety Funza which was obtained by selection in a local field.—E.B.O.

456 Wellington, P. S. **Effect of desiccation on the dormancy of barley.** *Nature, Lond.* 1956, **178,** No. 4533, 601, bibl. 4. [Off. Seed Test Sta., Cambridge]

Dormancy in barley grain is prolonged in seasons when atmospheric humidity is high in the period prior to harvesting. This study on the effect of desiccation (grain dried for 10 days at 16–18°C., or 3 days at 40°C. and 7 days at 16–18°C.) has shown that although a varying proportion of barley grain may fail to reach maturity because of insufficient desiccation before harvest, this can be corrected by artificial drying during subsequent storage.—M.H.

457 Schmidhauser, T. Natur und Verteilung der löslichen Kohlenhydrate im ruhenden und keimenden Gerstenkorn. [**The nature and distribution of soluble carbohydrates in resting and germinating barley grain.**] *Ber. schweiz. bot. Gesellsch.*

1956, **65**, 302–42, bibl. 77, illus. [Bot. Inst., Univ. Zürich]

The qualitative and quantitative changes in the free-sugar content of barley grain during germination were determined by paper-chromatographic analysis. The changes were traced in the embryo (including scutellum, plumule, coleoptile and radicle) and the endosperm (including the actual nutrient tissue and the seed coat). The technique is described, results are tabulated, and the following aspects of the findings are discussed : the breakdown of starch by amylase and by phosphorylase ; the transport and relative concentrations of soluble carbohydrates in cereal grains ; and the utilization of the sugars released, in respiration and formation of new tissues.—D.B.

458 MIKAELSEN, K. and others. **Experiments on the effects of neutron-irradiation on the respiration of barley seeds. 1. Effects on growth and oxygen-uptake in barley seedlings of different varieties.** *Physiol. Plant.* 1956, **9**, No. 4, 697–711, bibl. 14, illus. [Inst. Genet. and Pl. Breed., Vollebekk ; Bot. Lab., Univ. Oslo, Norway]

Grains of 3 barley varieties were exposed to neutrons at 300–3600 reps. Germination capacity was unaffected but seedling growth was seriously impaired ; the reduction in seedling length with dose was almost linear. Rate of respiration was unimpaired during the first 2 days after germination, but from the 3rd to 7th day there was a marked reduction. It was concluded that the respiratory mechanism was unimpaired by the ionizing radiation, but that the synthesis of important substances was seriously affected. The reduction in growth was proportional to the decrease in respiration and to the frequency of damaged cell nuclei. The water content of the seedlings was also reduced by irradiation.—J.F.G.

459 SUBBA RAO, M. S. and LAL, K. N. **Sufficiency and deficiency effects of zinc on the physiology of barley.** *Sci. and Cult.* 1956, **22**, No. 3, 166–7, bibl. 6.

460 ZABLUDA, G. V. and PROSTEVA, M. I. **[The translocation of radio-active phosphorus absorbed by the leaves of tillering barley plants.]** [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1956, **109**, No. 2, 397–9, bibl. 8, illus. [Ural State Univ., Sverdlovsk]

Various works have shown that nutrients, absorbed by the seminal and nodal roots and translocated to the above-ground parts in tillering cereal grasses, are distributed between the main and lateral stems [see *Fld Crop Abstr.* 6 : 498]. There is little information, however, regarding the translocation in tillering plants of mineral substances absorbed from foliar sprayings and in this connexion the use of radio-active isotopes is a help. The authors' study was designed to investigate the translocation of nutrients between the main and lateral stems of Viner barley at different stages of growth (tillering, shooting, earing), using a solution of $Na_2HP^{32}O_4$ at a concentration of 0·1 mc./ml. applied to the leaves at 2 mc. per plant at the tillering phase and at 3 mc. per plant at the shooting and earing phases. Under the conditions of the numerous tests in which content of radiophosphorus in leaves, stems and ears was determined (by means of radiophotographs and a Geiger-Müller counter, and calculated as impulses/min. per 1 g. dry substance), there is evidence that, after 6 hr. from the initiation of the experiment, radioactive P is translocated at the shooting phase from leaves of the branch stems to the tillering nodes and then to the uppermost leaves of the main stem. At the tillering phase radioactive P absorbed by the leaves is translocated from the main stem to the branch stems and also from the branch stems to the main stem. Radioactive P absorbed by the leaves is translocated more intensively from the main stem to the lateral stems than from laterals to the main stem.—M.H.

461 SKRIPČINSKIĬ, V. V. **[Some peculiarities of phasic development in different varieties of barley, ensuring the possibility of their hibernation.]** [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1956, **109**, No. 6, 1210–13, bibl. 19, illus. [Stavropol Agric. Inst.]

In order to study ecological/physiological factors which react on the phasic development of crops, the author designed various experiments, one of which (here reported) is concerned with barley varieties differing in their winter resistance and phasic development. The crops are the winter hardy types Krasnyĭ Dar and Stavropoljskiĭ 7, in addition to the non-hardy spring variety Kruglik 0188/49. A third group comprises two types of indeterminate character, but usually considered as winter forms, namely, Pallidum 17 and Kruglik 021. The crops were sown on 27 Sept. 1955 and grown under natural, 8-hr. and continuous day. Air temperatures rose from 13·0°C. to 14·4°C. between the 3rd week in Sept. and the 3rd week in Oct., but fell sharply to 4·0°C. and 1·6°C. during the first 3 weeks in November. The plants were thus chilled and at the onset of these low temperatures (9 and 11 Nov.) the lengths of stem internodes and apical growth were recorded. There is evidence that Krasnyĭ Dar and Stavropoljskiĭ 7 (biologically winter types) do not react to change in daylength. Kruglik 0188/49 reacts under continuous day to the extent of initiating anthers in the florets and under 8-hr.

day ear differentiation with flower initials is observed. Kruglik 021 and Pallidum 17 also react to changes in daylength. Under continuous light they achieve the same stage of development as the spring type Kruglik 0188/49, but under an 8-hr. day they behave as winter types. This confirms that the three types, Kruglik 0188/49, Kruglik 021 and Pallidum 17 are biologically spring forms, the difference between them being in their reaction to daylength. Kruglik 0188/49 is more a short-day type than are Kruglik 021 or Pallidum 17. In other words, Kruglik 0188/49 under the natural 12–10 hr. days of autumn and even under artificial short day (8-hr.) can complete the photophase, but under these conditions Kruglik 021 and Pallidum 17 do not pass this phase. To elucidate how winter resistance of these plants is affected by daylength, their condition was noted after the first frosts (30 Nov.–2 Dec. 1955). The plants were dug up and kept in vessels at room temperature for 2 weeks. The data confirm that in different barley varieties two forms are evolved in regard to overwintering. One form acquires a winter character by which it is possible to complete the vernalization phase during autumn. This prevents further development until chilling enhances frost resistance. The same result may be achieved by spring forms which cannot pass the photophase in the short days of autumn. The adaptation to hibernation in annual plants may arise not only by their acquiring a long vernalization stage but also by being grown under the particular conditions for passing the light stage of development. The instances designated as " transformations " of spring to winter types (e.g. Pallidum 17) appear rational in the light of the above. In a population comprising spring varieties and forms able to pass the light phase in short autumn photoperiods, there may be specimens which can pass this phase only in longer day. When sown in autumn, the former would inevitably perish during the winter but the latter would be preserved. As a result of such selection, the constitution of the population would be changed and in the second autumn sowing, seed of the unaffected plants would produce winter-hardy types. In the absence of such preliminary knowledge, this would give the impression of " transformation," i.e. the converting of biologically spring types to biologically winter types. The author advocates the use of the term " spring/wintering" for these types, which expression is already applied in weed classification. —M.H.

MAIZE

462 Bulletin Technique d'Information. Le maïs. [**Maize.**] *Bull. tech. Inform.* 1955, No. 105, 681–887, illus.

This bulletin, which is a collection of papers by many authors, reviews the present situation of maize-growing in France where the area under this crop increased from 325,300 ha. in 1950 to about 445,000 ha. in 1955. By the use of suitable hybrids it has been possible to extend the growing of grain maize into the region north of the river Loire, where this crop was only exceptionally grown before. The principal aspects examined are : maize improvement ; seed production ; performance of maize hybrids and varieties ; maize-growing in various French regions ; pest control and ensilage of fodder maize.—E.B.O.

463 Cavazza, L. La maiscoltura in Calabria. [**Maize-growing in Calabria (Italy).**] *Maydica* 1956, **1**, No. 3, 71–84, illus. [Ist. Agron., Univ. Bari]

464 Grillot, G. L'amélioration du maïs et de sa culture au Maroc. [**The improvement of maize and of its cultivation in Morocco.**] *Cah. Rech. agron. 6. Dir. Agric. et Forêts, Morocco* 1955, 1–27, bibl. 12, illus. [Cent. Rech. Agron., Rabat] [See also *Fld Crop Abstr.* 9 : 734.]

465 Hutter, W. Essais culturaux de maïs hybrides (à l'irrigation). [**Trials on growing maize hybrids under irrigation (in Morocco).**] *Cah. Rech. agron. 6. Dir. Agric. et Forêts, Morocco* 1955, 115–60. [Cent. Rech. Agron., Rabat] [See also *Fld Crop Abstr.* 9 : 1139.]

466 Desobry. Essais de culture de maïs : repiquage en Seine-et-Oise. [**A cultural trial with maize : transplanting in Seine-et-Oise.**] *C.R. Acad. Agric. Fr.* 1956, **42**, No. 3, 171–2.

A field comparison was made in 1953–5 between sown maize and transplanted maize. The planted maize was 15–21 days earlier than the sown maize. In the 3 years of the trial the yields of the planted maize were 8600, 10,000 and 11,000 kg. of grain per ha. and those of the sown maize 6600, 7000 and 7500 kg./ha.—E.B.O.

467 Green, V. E., Jr. Asociación de altura de planta y cosecha en maíz tropical. [**Relationship between plant height and yield in tropical maize.**] *Turrialba* 1955, **5**, No. 3, 83–90, bibl. 9, English abstract. [Everglades Exp. Sta., Florida Univ.] [Received June, 1956]

There is a positive correlation between plant height and grain yield in tropical maize.—From English abstract.

468 Zuber, M. S. and Decker, W. L. **Effects**

of 1954 drouth on corn. *Res. Bull. 604 Missouri Agric. Exp. Sta.*, 1956, pp. 20, bibl. 12, illus.

Although maize produced functional pollen at 113°F. air temperature, the percentage of good sets from hand pollination was reduced. Number of days from sowing to tasseling was influenced in decreasing order by irrigation, population density and N fertilization, although the lowest level of N (120 lb./ac.) was in excess of requirements. The most consistent and best timing between tasseling and silking occurred with the highest level of irrigation, greater N application and smaller population density. The two last factors were of insignificant influence in non-irrigated plots where " blasting " and " burning " of tassels was greater than in irrigated plots. The % of plants without silks was greatest in non-irrigated plots and was increased by higher plant densities. Although air temperatures at different heights in irrigated and non-irrigated plots were not significantly different, more heat was absorbed and the air was less humid in the sparse cover of the latter plots.—M.H.F.

469 Brandolini, A. Mais in coltura estivo-autunnale dopo frumento. Parti 1 e 2. [**Maize grown in summer-autumn after wheat.**] *Ann. Sper. agr.* 1956, **10,** No. 3 and 4, 1007–28 and 1111–41, bibl. 9, illus., English summary. [Sta. Sper. Maiscolt., Bergamo, Italy]

Maize grown as a catch crop after wheat is important in Italy, mainly in the northern regions, where this crop is often affected by cold, wet weather during the last part of its vegetative cycle (Oct./Nov.). The early, flint, free-pollinated variety Cinquantino " Sacra Famiglia " is particularly adapted to this type of cultivation while the early dent hybrids from North America have not shown adaptation.—E.B.O.

470 Popow, G. and Keller, A. Maishybrid Orla 266. [**The maize hybrid Orla 266.**] *Mitt. schweiz. Landw.* 1956, **4,** No. 10, 153–62, illus. [Eidg. Landw. Versuchsanstalt Zürich-Oerlikon (G.P.) ; and Landw. Schule Custerhof-Rheineck (A.K.)]

Orla 266 was tested against Rheinthaler (a local variety) and Wisconsin 255 and Wisconsin 270, the 3 varieties from which Orla 266 was bred. In grain yield, Orla 266 exceeded Wisconsin 255 by 22%, Wisconsin 270 by 27% and Rheinthaler by 45%. Earliness was assessed by water content [of the grain] at harvesting. On this basis, Orla 266 was later than Wisconsin 255 and earlier than Wisconsin 270 and Rheinthaler. Resistance to lodging, evaluated as the percentage of erect and unbroken plants per plot, was greater in Orla 266 than in Wisconsin 255 and Rheinthaler, but did not attain the very good resistance of Wisconsin 270. In early development Orla 266 was as good as Rheinthaler and better than the Wisconsin varieties. On the basis of these properties Orla 266 is recommended for cultivation as grain maize in those districts in which Wisconsin 270 or Rheinthaler are cultivated, but it can replace Wisconsin 255 only where this is cultivated in a favourable climate. When grown for silage Orla 266 can replace all 3 other varieties. The plant density for grain maize is 6 plants per sq. m. and for silage maize 12 plants per sq. m. Seed is produced by repeating the original cross using the higher grain-yielding variety as the female plant.—D.B.

471 Brandolini, A. **Il Wisconsin 270.** *Maydica* 1956, **1,** No. 3, 85–8, illus.

Wisconsin 270, a very early dent maize hybrid produced commercially in Italy since 1954, has been found suitable for cultivation in central and southern Italy.—E.B.O.

472 Brandolini, A. Una varietà sintetica per la coltura estivo-autunnale dopo frumento : il Sintetico Zanchi. [**A synthetic variety (of maize) for cultivation (in Italy) in summer-autumn after wheat : " Sintetico Zanchi".**] *Maydica* 1956, **1,** No. 2, 48–56, bibl. 12, illus.

473 Cornu, A. Les maïs hybrides américains au Maroc. [**The American maize hybrids in Morocco.**] *Cah. Rech. agron. 6. Dir. Agric. et Forêts, Morocco* 1955, 29–114, bibl. 14, illus. [Cent. Rech. Agron., Rabat]

[See also *Fld Crop Abstr.* 8 : 835 and 9 : 735.]

474 Bogyo, T. P. **Maize varieties in Natal and East Griqualand.** *Fmg in S. Afr.* 1956, **32,** No. 6, 57–64, illus.

475 Secretaría de Agricultura y Ganadería. México. Maíz híbrido para el Bajío y regiones similares. Rocamex H-309, Rocamex H-230, Rocamex H-220. [**Hybrid maize for Bajío and similar regions. Rocamex H-309, Rocamex H-230, Rocamex H-220.**] *Foll. Divulg. 19. Sec. Agric. Ganad., Mex.* 1955, pp. 35, illus., English summary.

476 Hoppe, P. E. **Correlation between corn germination in laboratory cold tests and stands in the field.** *Pl. Dis. Reptr* 1956, **40,** No. 10, 887–9, bibl. 1, illus. [Wisconsin Agric. Exp. Sta., Madison]

It was concluded that maize cold tests are useful in detecting mediocre or poor seed lots, which pass current test standards, and that old seed should be retreated with thiram.—J.F.C.

477 STANIFORTH, D. W. **Plant competition studies with field corn and *Setaria* spp.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 3. [Iowa State Coll., Ames]

In these experiments the effects of *Setaria* spp. and fertilizer application on the yield of maize was studied by removal of the weeds at stages in the growth of the crop. The maize was planted at 2 different densities each with and without N, P and K. In 2 seasons the high levels of N fertilizer produced the highest yields of maize and weeds and the lowest yield-losses due to weed infestation. Maize yields fell by 6–8 bu. per ac. when weeds were left to mature in unfertilized plots and in plots which received 70 lb. per ac. N. No appreciable maize-yield losses occurred when 140 lb. per acre was applied even when weeds were left to maturity. When weeds were removed at or prior to tassel emergence no yield reduction resulted. Yields of weeds were slightly lower in plots with 16,000 maize plants per acre than with 12,000 plants per acre.— *Weed Abstr.* 5 : 887.

478 STANIFORTH, D. W. **Control of certain annual grass weeds in corn.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 27–8. [Iowa State Coll., Ames]

The problem of grass weeds in maize is discussed. Treatments with 1–2 lb. per acre of 2,4-D (amine) applied when maize is between the coleoptile and 2–3 leaf stages gave excellent control of *Setaria* spp. When followed by shovel cultivations a practically weed-free crop was obtained. CMU at 1–2 lb. per acre applied at the same stage of growth also gave good control of *Setaria* spp. with little crop injury. The residual effect of CMU is greater than that of 2,4-D amine and CMU may also be used on larger seedlings of *Setaria* spp.—*Weed Abstr.* 5 : 912.

479 GRIGSBY, B. H. and others. **Growth of cucumbers, corn, field and snap beans following chemical sprays for control of quackgrass.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 46–7. [Michigan State Univ., E. Lansing]

Various combinations of dalapon, amino triazole and MH were applied to a 2-year-old sod of *Agropyron repens*, which was ploughed 7 days later and prepared for sowing. Dalapon at 10 lb. per acre and at 5 lb. in combination with 2 lb. of amino triazole and 2 lb. MH gave good control of *A. repens*. Yields of maize were not reduced by any treatments. Crop yields were more affected by competition from *A. repens* than from any chemical treatment.—From *Weed Abstr.* 5 : 926

480 ENNIS, W. B., Jr. **Responses of corn to 3-amino-1,2,4-triazole.** *Proc. 9th S. Weed Contr. Conf.* 1956, 71–9, bibl. 4. [Mississippi Agric. Exp. Sta., State College]

In 1954, the lower 4 leaves or the ear shoots and adjacent leaf sheaths of maize 10 ft. high were sprayed with 1·5% amino triazole. In the following year the maize was treated at 7 growth-stages. The effects on the maize kernels, which included necrosis, reduction in starch- and oil-contents, increase in reducing-sugar content and production of chlorotic seedlings, were recorded.—G.M.W.

481 RUPPEL, R. F. and others. Control de los " cogolleros ", " gusanos-ejercito " y " trozadores " del maíz en Colombia. [**Control of the larvae of the Phalaenidae on maize in Colombia.**] *Agric. trop., Bogotá* 1956, **12**, No. 1, 35–46, illus.

Toxaphene applied at the rate of 1·25 kg. per cuadra [1 cuadra=6400 sq. m.] and aldrin at the rate of 300 g. per cuadra gave the best control.—E.B.O.

482 LUCAS, J. R. and DARRIGRAND, M. Une méthode de lutte contre les taupins applicable aux cultures de maïs. Traitement sur la ligne de semis (localisation). [**A method for controlling click beetles applicable to maize crops. Treatment in the drill (localization).**] *C.R. Acad. Agric. Fr.* 1956, **42**, No. 3, 165–8, illus., bibl. 2.

Results from field trials indicated that aldrin drilled with the seed at the rate of 1 kg. of active substance per ha. was highly effective for controlling click beetles [fam. Elateridae], the maize yield being 6672 kg. of dry grain per ha. The yields from the fields treated with aldrin at 3 kg./ha. and HCH at 10 kg./ha., both applied to the whole area, and from the controls, were 6312, 5802 and 2860 kg./ha., respectively.—E.B.O.

483 OAKES, J. Y. and others. **A preliminary report on soil fumigation for control of parasitic nematodes on corn at Curtis, Louisiana.** *Pl. Dis. Reptr* 1956, **40**, No. 10, 853–4. [Red River Val. Exp. Sta., Curtis, La]

Good nematode control was obtained from Dowfume MC2, applied to maize at 2 lb./100 sq. ft., and from a D-D mixture at 25 gal./ac. The average yields on the control plot and on the fumigated plots, in order, were : 68·8, 94·0 and 87·7 bu./ac. Root development was more extensive in the treated plots.—J.F.C.

484 GARRISS, H. R. and WELLS, J. C. **Parasitic herbaceous annual associated with corn disease in North Carolina.** *Pl. Dis. Reptr* 1956, **40**, No. 10, 837–9, bibl. 4, illus. [N. Carolina State Coll., Raleigh]

A flowering plant associated with poor growth and dying of maize was tentatively identified as a *Striga* sp. This is thought to be the first record of

this genus in America. Observations suggested that it may also be parasitic on crabgrass (*Digitaria sanguinalis*).—G.M.W.

485 Fehrenbacher, J. B. and Rust, R. H. **Corn [maize] root penetration in soils derived from various textures of Wisconsin-age glacial till.** *Soil Sci.* 1956, **82,** No. 5, 369–78, bibl. 8, illus. [Dep. Agron., Univ. Illinois]

486 Ginrich, J. R. and Russell, M. B. **Effect of soil moisture tension and oxygen concentration on the growth of corn [maize] roots.** *Agron. J.* 1956, **48,** No. 11, 517–20, bibl. 11, illus. [Univ. Illinois]

487 Thornburg, W. L. **An electron microscopic examination of the formation of starch granules in corn [maize] endosperm.** *Diss. Abstr.* 1956, **16,** No. 5, 860–1. [Purdue Univ., Lafayette, Ind.]

488 Vatter, A. E., Jnr. **The structure of the maize chloroplasts.** *Diss. Abstr.* 1956, **16,** No. 5, 851–2. [Univ. Illinois]

489† Moiseeva, M. N. **[Physiologically-active substances in grass tissues.]** [Russian] *Bot. Ž.* (*Bot. J. USSR*) 1956, **41,** No. 4, 560–8, bibl. 52, illus. [Leningrad]

In this review of phytohormone studies there is information on impeding root growth in maize (under conditions of the tests) by phytohormones obtained : (1) from different parts of the maize coleoptile ; (2) from stems of various cereals ; (3) from tissues in oat stems at the time of flowering; and (4) from roots, pollen, unripe seed and leaves of various grasses.—M.H.

490 Virtanen, A. I. and others. **An antifungal factor in maize and wheat plants.** *Suom. Kemist. B.* 1956, **29,** 143, bibl. 1. [Lab. Found. Chem. Res., Biochem. Inst., Helsinki, Finland]

A methoxy 2(3)-benzoxazolinone, isolated from young maize and wheat plants, has the same activity as 2(3)benzoxazolinone. At *c.* 0·04%, both substances inhibit a wide range of fungi and bacteria. [See also Abs. 443.]—J.F.G.

491 Inselberg, E. **Factors affecting earshoot development in dent corn.** *Diss. Abstr.* 1956, **16,** No. 9, 1572. [Univ. Illinois]

With an increase in the sowing rate of L317 × R4 maize, the silking date of each earshoot was delayed and the mean number of ears per plant decreased. In undisturbed plants growing at the rate of 1 per hill, 40×40 in. apart, the upper 2 earshoots developed into mature ears on all the plants, whereas the 3rd earshoot set some seed in only 1% of the plants. After removal of the uppermost earshoot at silking, all of the 3rd earshoots produced seed. Prevention of 1 or 2 earshoots from being pollinated resulted in the development of small ears by a considerable fraction of the 3rd earshoots. About 2 weeks after silking, the 3rd earshoots were much higher in reducing sugar and in mineral nutrients, but much lower in sucrose and IAA than the upper 2 earshoots, but when induced to develop by removing the uppermost earshoot, they approached the 2nd earshoot in composition. Continued growth of the earshoots, correlated with increasing concentrations of IAA, resulted in the conversion of sugars to starch and cellulose and the continued supply of nutrients by translocation. —From abstract.

492† Weinmann, H. **Studies on the chemical composition and nutrient uptake of maize.** *Rhod. agric. J.* 1956, **53,** No. 2, 168–81, bibl. 11, illus. [Chem. Branch, Dep. Res. Spec. Servs, Salisbury, S. Rhodesia]

Dry-matter yields and chemical composition of grain and stover of Rhodesian Hybrid No. 1 maize harvested at the Salisbury Experiment Station from plots receiving different rotational and manurial treatments were determined. Application of P slightly increased the P content of the grain, otherwise the various manurial treatments had little influence on the chemical composition. The nutrient uptake in lb. per ac. was nearly proportional to the air-dry grain yields. The larger proportion of N and P was in the grain but the stover contained the larger proportion of K and nearly all the Ca. Samples of a single hybrid maize, 51H6, taken during grain formation, showed that while ear dry weight increased during the whole period of the test, the dry-matter yield of stover increased only up to the early dough stage and then fell. Absorption of N, P, K and Ca continued up to the early dough stage ; nearly all the N and some of the P was translocated to the developing ears. Nutrient loss from the stover occurred during maturation. The K and Ca were lost from the aerial parts of the plants.—From author's summary.

493 Ellis, B. G. and others. **Nutrient content of corn as related to fertilizer application and soil fertility.** *Agron. J.* 1956, **48,** No. 10, 455–9, bibl. 11. [Kansas Agric. Exp. Sta., Manhattan]

Chemical analyses of the third leaf from the base of the maize plant were made in conjunction with these fertilizer experiments. Correlations were established in the case of K content of the leaves and exchangeable K in the soil, but not in the case of P. The N content of leaves decreased with increasing

age and the date of sampling was important.—G.M.W.

494 Rasmussen, G. K. **The use of chelating agents in the microelemental nutrition of corn.** *Diss. Abstr.* 1956, **16,** No. 5, 858–9. [Purdue Univ., Lafayette, Ind.]

It was found that microelements could be added at higher concentrations in the chelated than in the ionic form without causing symptoms of toxicity in maize seedlings. Inhibition by Na_4EDTA of O_2-uptake by root tips was partially reversed by additions of Fe, Cu, Mn and Ni. Mutual antagonism between microelements, as measured by O_2-uptake, was shown, whether they were chelated or ionic in the nutrient solution.—From abstract.

495 Leone, Ida A. and others. **Atmospheric fluoride: its uptake and distribution in tomato and corn [maize] plants.** *Pl. Physiol.* 1956, **31,** No. 5, 329–33, bibl. 13. [Dep. Pl. Path., Rutgers Univ., New Brunswick, N.J.]

496 Sen, S. and Kavitkar, A. G. **Statistical studies of the crop yield data of the Pusa permanent manurial experiments. (New Series) 1. Study of maize yields.** *Indian J. agric. Sci.* 1956, **26,** Pt. 1, 105–29, bibl. 8, illus. [Ind. Agric. Res. Inst., New Delhi]

Maize was grown annually as a kharif crop and oats, peas, wheat and gram [*Cicer arietinum*], as rabi crops in a 4-year rotation. The maize was subjected to 10 manurial treatments with 10 replicates each and the results for 1932-52 were analysed. Rape cake (at 40 lb. N/ac.) gave the highest yields. Farmyard manure (40 lb. N/ac.) and inorganic NP (40 lb. N, 80 lb. P_2O_5) and NPK(40–80–50) gave similar responses. $(NH_4)_2SO_4$ (40 lb. N/ac.), by itself gave responses inferior to NP or NPK. In general, maize benefited from N treatments, while non-N treatments had practically no effect. All treatments resulted in a progressive deterioration in maize yields. The annual yield variation was great in those plots which received non-N fertilizer, but small in those which received organic manures.—J.F.C.

497 Viégas, G. P. Adubação do milho. 2. Adubação mineral quantitativa. [**Manuring of maize. 2. Quantitative chemical manuring.**] *Bragantia* 1954–5, **14,** No. 16, 149–70, bibl. 6, English summary.

498 Viégas, G. P. and Catani, R. A. Adubação do milho. 3. Adubação mineral quantitativa. [**Manuring of maize. 3. Quantitative chemical manuring.**] *Bragantia* 1954–5, **14,** No. 17, 171–8, bibl. 1, English summary.

499 Viégas, G. P. and others. Adubação do milho. 4. Adubação azotada em cobertura. [**Manuring of maize. 4. Nitrogen manuring as top-dressing.**] *Bragantia* 1954–5, **14,** No. 18, 179–92, bibl. 18, English summary.
[Pp. 179–86 inclusive are missing.]

500 Freire, E. S. and Viégas, G. P. Adubação do milho. 5. Considerações sôbre o uso de excesso de sementes em trabalhos experimentais. [**Manuring of maize. 5. Observations on the use of an excess of seed in experimental work.**] *Bragantia* 1954–5, **14,** No. 20, 203–14, bibl. 11, English summary. [Inst. Agron., São Paulo, Brazil] [Received July, 1956]

501 Laird, R. J. and others. Fertilizantes comerciales y densidad optima de población para maíz de riego en Guanajuato, Querétaro y Michoacán. [**Commercial fertilizers and optimal plant density for maize under irrigation in Guanajuato, Querétaro and Michoacán.**] *Foll. tec. 16. Sec. Agric. Ganad., Mex.* 1955, pp. 63, bibl. 20, illus., English summary.

Results from field trials, carried out with maize in 13 localities in Mexico, showed great responses to N manuring in 9 localities (medium to heavy soils, continuously cropped for many years), where the application of 40, 80 and 120 kg. of N per ha. gave average increases in yield of 950, 1890 and 2880 kg. of grain per ha., respectively. The 4 soils that failed to respond to N manuring were dark soils with a medium to high content of organic matter. As significant responses to P manuring were noted in 3 localities, it is recommended that 30 kg. of P_2O_5 per ha. be applied on soils which have been cropped for many years and 60 kg. of P_2O_5 per ha. on organic soils. The optimal plant density was found to increase with yield. A table shows the recommended plant densities, based on estimated yields, for the maize hybrids H-309 and H-230 grown under irrigation with different manuring treatments, and also the corresponding distances between the hills (2 plants per hill) when the furrows are 92 cm. apart. For yields varying from 1 to 7 metric tons per ha., the plant density varies from 25 thousand to 50 thousand plants per ha.—E.B.O.

502 Kennard, W. C. **Effect of krilium on *Zea mays* L. grown in two tropical soils.** *Trop. Agric., Trin.* 1957, **30,** No. 1, 51–4, bibl. 5, illus. [Fed. Exp. Sta., U.S. Dep. Agric., Mayaguez, Puerto Rico]

Significant increases in maize germination and yield were obtained on 2 soil types in Puerto Rico, following the application of up to 2000 lb. krilium/ac. Results indicated, however, that the purchase and application of the soil conditioner were not financially justified.—M.P.

503 ALEXANDER, F. E. S. and CLIFFORD, H. T. **Differential insecticide damage in maize varieties.** *Nature, Lond.* 1957, **179,** No. 4550, 109. [Ibadan Coll., Nigeria]

A mixture of three parts of ethylene dichloride and one part of carbon disulphide (by volume) applied at the rate of 0·6 c.c./litre of storage space by pouring the liquid on to the surface has been effective for some years in preventing insect damage to maize grain (var. Tsolo) stored in closed bins. In 1956 the variety Mexican Elite was grown instead of Tsolo, and the grain after storage was found to have a very low germination capacity. A series of experiments was carried out to test the hypothesis that the insecticide was affecting the grain adversely, and that some varieties of maize were more susceptible than others to this treatment. The data recorded show that treatment adversely affects grain viability, that reaction to the treatment varies in different varieties, and that the suppression of germination and stunting of growth are not necessarily parallel effects.—M.H.

MILLETS AND SORGHUM

504 RAJARATHNAM, S. **Jola [*Sorghum vulgare*] cultivation in Bellary district [Mysore State, India].** *Mysore agric. calendar and yrbk 1955,* 1956, 35–7. [A.R.S. Siruguppa, Mysore, India]

505 IYENGAR, G. S. and IYENGAR, K. G. **American sorghums in Mysore.** *Mysore agric. J.* 1956, **31,** No. 2, 75–6, illus.

Eight sorghum varieties introduced from the USA gave an economic return when sown at the end of April or early May. Of these, Bonita and early Kalo gave the highest grain yields and were early maturing (3 weeks before the local variety) but had an unsuitable grain colour and gave low stover yields. Norkan C.I. gave a stover yield second only to the local variety and a medium grain yield.—J.F.C.

506† LEONARD, W. H. and others. **Sorghum varieties for Colorado.** *Bull. 494–5 Colorado Agric. Exp. Sta.,* 1956, pp. 30, bibl. 16, illus.

Grain yields of 8, and hay yields of 13, varieties of non-irrigated *Sorghum vulgare* are reported, together with 4-year averages of 11 grain- and 9 fodder-trials under irrigation.—M.H.F.

507 KIDD, H. J. **The morphology of the panicle in the cultivated sorghums.** *Diss. Abstr.* 1956, **16,** No. 9, 1568. [Washington Univ.]

A general survey of the vegetative and panicle morphology of cultivated and weed sorghums is presented. Though based on different types of evidence, the classification strongly resembles previous systems.—From abstract.

508 BAPTIST, N. G. and PERERA, B. P. N. **Essential amino-acids of some tropical cereal millets.** *Brit. J. Nutr.* 1956, **10,** No. 4, 334–7, bibl. 6, illus. [Dep. Physiol., Univ. Ceylon, Colombo]

The values of 8 essential amino-acids were determined in little millet (*Panicum miliare*), Indian millet (*P. miliaceum*), foxtail millet (*Setaria italica*) and Brachiaria millet (*Brachiaria ramosa,* formerly known as *Panicum ramosum*). The results were compared with those for maize, rice, wheat, finger millet (*Eleusine coracana*) and sorghum.—M.P.

509† BURLESON, C. A. and others. **Effect of nitrogen fertilization on yield and protein content of grain sorghum in the lower Rio Grande Valley of Texas.** *Agron. J.* 1956, **48,** No. 11, 524–5, bibl. 8. [Lower Rio Grande Valley Exp. Sta., Welasco, Texas]

In a field experiment with grain sorghum, applications of 60 and 120 lb. N/ac. gave significant increases in both content and yield of protein in the grain and forage, and the apparent recovery was 83·2 and 89·6% for the 2 rates of N, respectively.—Authors' abstract.

RICE

510 CLAVE, P. Aspect actuel de la riziculture métropolitaine. [**Present aspect of rice-growing in France.**] *Bull. tech. Inform.* 1956, No. 109, 191–215, bibl. 22, illus.

511 WIT, T. de. **The Wageningen rice scheme in Suriname.** *Trop. Agric., Trin.* 1957, **34,** No. 1, 29–40, illus.

A general account is given of a rice-production project inaugurated in 1949 for the ultimate development of 15,000 ha. of uninhabited swamp in the north-west coastal plain of Surinam.—M.P.

512 AGLIBUT, A. P. and HOFF, P. R. **Effects of continuous and discontinuous submergence on rice lodging and yield.** *Philipp. Agriculturist* 1956, **39,** No. 8, 453–64. [Cent. Exp. Sta., Univ. Philipp., Laguna, Philippines]

Continuous submergence produced the least lodg-

ing of Mangasa, Thailand and Milfor 6–2, whereas submergence during the first and last stages of growth and development produced the highest. No case of lodging on account of poor root anchorage was observed. The percentage of lodging was least in Milfor 6–2 and highest in Thailand. The irrigation treatments produced no significant differences in yield in the same variety. There was no positive relationship between lodging and height in Milfor 6–2 and Thailand. In Mangasa, however, lodging was strongly associated with height.—From authors' abstract.

513 Yamaguchi, H. and Namiki, K. **Studies on technical improvement of paddy culture on ill-drained fields. 2. On the effects of Baido in ill-drained paddy fields.** [Japanese] *Proc. Crop Sci. Soc. Japan* **24,** No. 4, 268–70, illus., English summary. [Chiba Agric. Exp. Sta.]

On the poorly-drained soils of the Chiba Prefecture the "Baido" practice of earthing up the rice-plant hills was compared with ordinary tilling. The following advantages were obtained from the Baido practice: an increase in plant height, number of tillers and depth of green of the leaves; an improvement in chemical composition of the soil; an increase in the absorption by the plant of inorganic salts of Mn, Mg, K and Ca (especially K); an increase in the number of yield-contributing organs; and an increase in grain yield. These good results are associated with improved aerobic respiration by the roots but are obtained only when the Baido practice is carried out soon after transplanting, when roots are not easily injured.—D.B.

514 Wada, J. and Toriyama, K. **Effects of green rye ploughed in the ground upon rice crops.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24,** No. 4, 242–3, illus., English summary. [Aomori Agric. Exp. Sta.]

Growth and yield of rice were compared when grown on soil containing ploughed-in green rye at 246–600 kan per tan and on soil containing compost of 300 kan per tan. [1 kan = 3·75 kg.; 1 tan = 0·2451 acre] In warm years growth of rice was slower on the rye than on the compost-plots, but yields were similar. In cool years heading of rice was 8–9 days earlier on the rye- than on the compost-plots and yields were 98–149% higher. The improvement on the rye-containing plots in the cool years was attributed to the higher night temperature of the water in these plots, the higher temperature resulting from better control of water percolation and consequently lower irrigation-water requirements.—D.B.

515 Kimura, Y. **Researches on regional specificity of rice crop assorted to prefectures of Japan from 1878 to 1953.** [Japanese] *Bull. Fac. Agric. Univ. Miyazaki* 1956, **1,** No. 1, 1–125, bibl. 113, illus., English summary. [Univ. Miyazaki]

The principles governing increase in rice yield per unit area, diminution in variation of yields, and occurrence of normal and abnormal harvests in Japan are discussed on a statistical basis. It is noted that, in recent years, the northern area with a cool climate produces higher rice yields than the warmer region further south.—From English summary.—D.B.

516 Marie, R. Quelques résultats d'expérimentation rizicole. [**Some results from trials with rice.**] *Bull. tech. Inform.* 1956, No. 109, 223–8, illus. [Sta. Amélior. Plantes, Montpellier]

As a result of trials at Merle, southern France, in 1955, the following rice strains were included in the official catalogue of varieties. In order of increasing earliness, they are: Americano 1600–7, Balilla 28, Stirpe 136–7, Rinaldo Bersani, Razza 82–3, Arborio, Maratelli, Bellardone and Ishikari-Shiroke. These are Italian varieties, except the last, which is Japanese.—E.B.O.

517 López-Ríoboo T., F. and others. Registro de variedades de plantas. Ensayos comparativos de variedades de arroz. [**Register of plant varieties. Comparative trials with rice varieties.**] *An. Inst. nac. Invest. agron.* 1955, **4,** No. 2, 403–84, illus.

In trials carried out in Spain in 1954, the varieties which yielded best in most areas were Balilla, Benlloch × Omachi, Precoz verde, Puebla larga and Americano 1600.—E.B.O.

518 Piacco, R. Un nuovo tipo di riso precoce: "Lomello". [**A new early rice variety: Lomello.**] *Riso* 1956, **5,** No. 7, 12–13, illus.

Lomello (Agostano × Razza 77) is recommended for growing in Italy. Its vegetative cycle is 154 days; its stems are 117 cm. high and it yields about 5500 kg. per ha. in Vercelli area and 6500 kg. in Emilia.—E.B.O.

519 Tinarelli, A. Che cosa è l'Americano 1600? [**What is the "Americano 1600"?**] *Riso* 1956, **5,** No. 4, 20–4, illus., English and French summaries.

Information is given on Americano 1600, by far the most important rice variety in Italy, where it is grown on more than 50% of the rice area. It has become a mixture of biotypes and cannot be distinguished in practice from the variety Originario.—E.B.O.

520 Portères, R. Un riz précoce estimé en petite culture dans l'Ouest-Africain: le

Toulou-oule ou Konko (*O. sativa* L.). [**An early rice variety appreciated in small-scale farming in West Africa : Toulou-oule or Konko (*Oryza sativa*).**] *J. Agric. trop. et Bot. appl.* 1956, **3,** No. 1–2, 50–9, illus.

The characteristics and a botanical description are given of this hardy rice variety, the cultivation of which has been spreading during the last 20 years in West Africa, where it provides food in periods of scarcity. It is not considered suitable for large-scale farming and does not store well.—E.B.O.

521 CALMA, V. C. and BELOSO, C. G. **A plot test of five Thailand rice varieties and Seraup Kechil 36 Strain 482 under lowland conditions.** *Philipp. Agriculturist* 1955, **39,** No. 6, 299–305. [Cent. Exp. Sta., Univ. Philipp., Laguna, Philippines]

Seraup Kechil 36 strain 482 significantly outyielded Nang Tani, which yielded more than the other Thailand varieties—Bang Phra, Kao-Phu-Dard, Namdokmai, and Pin Keo.—Authors' abstract.

522 ALABOUVETTE, L. La production française de semences de riz. [**The production of rice seed in France.**] *Bull. tech. Inform.* 1956, No. 109, 217–21. [Éc. Nat. Agric., Montpellier]

The rice area in southern France (where rice-growing has developed by using seed imported from Italy) has reached, and become stabilized at, about 20,000 ha., the seed requirement of this area being at least 3,000,000 kg. The methods and difficulties involved in rice-seed production are described.—E.B.O.

523 SVINAREV, V. I. and BARANNIKOVA, E. V. [**The role of excretion by germinating rice grain in relation to the rice plant and *Echinochloa crus-galli*.**] [Russian] *Fiziol. Rast.* (*Pl. Physiol., USSR*) 1956, **3,** No. 3, 272–6, bibl. 13, English summary. [Astrakhan Complex Agric. Exp. Sta.]

The mutual effects of rice and the commonly associated noxious weed *Echinochloa crus-galli* were studied. In the field, increasing the depth of water during germination was found to decrease the number of rice plants and especially of plants of *E. crus-galli*. Seeds of the two species were germinated in a laboratory separately and together on sand and under water. In the mixture, the germination of each species, especially of *E. crus-galli* under water, was depressed. Solutions in which rice had been grown inhibited the germination of fresh rice. Also, compared with broad-row-sowing, narrow-row-sowing of rice, at the same rate, resulted in an increase in the surviving rice plants and a marked decrease in the number of plants of *E. crus-galli*. These results were hypothetically explained by the action of soluble organic substances, which, when excreted from rice, depressed the germination of *E. crus-galli*, and (in higher amounts) the germination of rice itself.—J.F.C.

524 VAN DINTHER, J. B. M. **Control of Pomacea (*Ampullaria*) snails in rice fields.** *Bull. 68 Landbproefsta. Surin.* 1956, pp. 20, bibl. 8, illus.

In Surinam, *Pomacea lineata* is a serious menace to rice. For its control, 1 kg. HCH or 200 g. $CuSO_4$/ha./cm. of water depth, applied at times suited to the cultivation method, is tentatively recommended. The intake and outlet of flood water are closed before application and kept closed as long as possible.—J.F.C.

525 KHAN, M. Q. and MURTHY, D. V. **Rice Hispa (*Hispa armigera* Ol.).** *Madras agric. J.*, 1956, **43,** No. 9, 450–5, bibl. 6.

Dusting with about 15 lb. 5% BHC [per ac.] is recommended for the control of this insect pest of rice.—M.P.

526 RIVERA, C. T. **Three organic insecticides in the control of insects affecting upland rice.** *Philipp. Agriculturist* 1956, **39,** No. 8, 465-72. [Cent. Exp. Sta., Univ. Philipp., Laguna, Philippines]

In tests for the control of the rice stem borer (*Schoenobius incertulas*), the rice leaf folder (*Cnaphalocrosis medinalis*) and the rice bug (*Leptocorisa acuta*), the following were applied at 300 gal./ha. : toxaphene (60%) at 3·2 cc./gal., TEPP (20%) at 9·5 cc./gal. and parathion (47%) at 4 cc./gal., spraying 3 times fortnightly or 6 times weekly. In both the 3-spray and 6-spray schedules, parathion, TEPP, and toxaphene were significantly effective in reducing the insect infestations in the field. Not one of the 3 organic insecticides showed an adverse effect on the leaves, stems and panicles of the rice plants.—G.M.W.

527 NILES, J. J. **2. The use of triphenyl tetrazolium bromide in viability tests of rice seed.** *Trop. Agriculturist* 1955, **111,** No. 4, 279–85, bibl. 2, illus. [Received Oct. 1956]

[See also *Fld Crop Abstr.* 8 : 451.] The further development of this work consisted in relating the topographical spread of the stain in the embryo and scutellum to germination. In viable seeds, the tetrazolium stain was present in the plumule, radicle, transition zone (between these), and in at least three-quarters of the scutellum. The optimum conditions for carrying out the test are pre-soaking for 2 hr. in water at 45–50°C. Evidence is presented which proves that this test provides an

accurate estimate of viability even during dormancy.—D.B.

528 TINARELLI, A. Indagine biometrica sulle cariossidi della razza "Rinaldo Bersani". [**Biometric investigation on the caryopsides of the rice variety Rinaldo Bersani.**] *Riso* 1956, **2**, No. 8, 29–36, illus.

529 TANAKA, S. and UEMURA, K. **Effect of naphthylamine on plant (1). Influence of α-naphthylamine on rice plant.** [Japanese] *J. Sci. Soil, Japan* 1956, **27**, No. 4, 161–5, bibl. 2, illus., English summary. [Meijyo Univ.]

The roots of rice seedlings growing in water culture increased 6–11% in weight and 8–20% in length with increasing concentrations (1–200 ppm.) of α-naphthylamine in the solution. In soil culture, α-naphthylamine in concentrations of 30 – 200 ppm. increased the number of tillers by 8–23% and the number of ears by 4–7%. There was little increase in yield of grain. For total yield, 30-50 ppm. α-naphthylamine was best.—From authors' summary.—D.B.

530 SHIMIZU, T. and TSUNO, Y. **Studies on yield-forecast of principal crops. 1. Photosynthesis in rice plants under field conditions with special reference to its changes with growth.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 303–6, bibl. 23, illus., English summary. [Hyôgo Agric. Statics and Survey Office]

531 VELASCO, J. R. and MANUEL, F. C. **The photoperiodic response of Elon-elon rice.** *Philipp. Agriculturist* 1955, **39**, No. 3, 161–75, bibl. 10, illus. [Cent. Exp. Sta., Univ. Philipp., Laguna, Philippines]

The experiments show that the Elon-elon variety of rice is a short-day plant capable of flowering only from November to March under natural conditions, regardless of the month of planting. The stage of ripeness-to-flower in this variety was apparently attained at about 15 days of age. The older the plant, however, the less short-day cycles were needed to initiate the flower buds. A shift from the short-day to the long-day treatment after flower-bud initiation delayed flower emergence. Short days, therefore, are needed in flower-bud initiation and flower-bud development. The number of day-and-night cycles until flowering varied with the different day-lengths. Both very long and very short days delayed flowering. The optimum day-length was 8 to 10 hr. Physiologically active compounds used in this study did not seem to affect flowering.—Authors' abstract.

532 TOGARI, Y. and others. **Studies on CO_2 exchange in crop plants. 5. A newly devised "Infrared CO_2-analyser", and some of the results obtained by it, comparing the diurnal changes in photosynthetic rate in rice plants under an isolated condition with that under a community condition.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 254–9, bibl. 6, illus., English summary. [Tokyo Univ.]

[See also Abs. 533.]

533 TAKEDA, T. and MARUTA, H. **Studies on CO_2 exchange in crop plants. 6. The effect of light intensity and spacing on the photosynthetic rate of rice plant in community conditions.** *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 331–8, bibl. 8, illus., English summary. [Tokyo Univ.]

[See also Abs. 532.]

534 YAMADA, N. and others. **Photosynthesis of rice plant. 3.** *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 246–53, bibl. 8, illus., Japanese summary. [Nat. Inst. Agric. Sci.]

In these experiments the emphasis is on the photosynthesis of rice as a member of a plant community. Rate of photosynthesis was determined in the field using a portable apparatus, which is described. Results are expressed in graphs which show the relationship between light intensity and the rate of photosynthesis in plants (1) sown at different spacings in a nursery bed and in a paddy field, (2) at different stages of growth from tillering to maturity and (3) sown early, normally and late. [See also Abs. 120.]—D.B.

535 KUMURA, A. **Studies on the production and behaviour of carbohydrates in rice plant. 3. Influence of environmental conditions on accumulation of carbohydrates.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 324–30, illus., English summary. [Tokyo Univ.]

The influence of N- and P-nutrition and of light intensity on carbohydrate formation and distribution were investigated. Under ordinary conditions [of photosynthesis] 90–95% of the carbohydrates accumulated in the panicles at maturity. If photosynthetic activity had been particularly vigorous the carbohydrates were stored also in the vegetative organs, especially the culms.—D.B.

536 RAJAGOPALAN, K. **Variability in size and frequency of stomata in leaves of rice varieties and its correlation in drought resistance.** *Madras agric. J.* 1956, **43**, No. 9, 429–43, bibl. 18, illus. [Agric. Res. Inst., Coimbatore]

The arrangement, size and frequency of stomata showed that there were fewer stomata in the upper than in the lower epidermis of rice leaves. No significant difference in stomatal size was found between the drought-resistant and drought-susceptible type. The size of the stomata increased from the top to the 3rd leaf, whereas the frequency decreased. —From author's summary.

537 Murakami, Y. **The growth of rice leaf sheath.** *Bot. Mag. Tokyo* 1956, **69**, No. 876, 258–62, bibl. 5, illus. [Nat. Inst. Agric. Sci., Nishigahara, Tokyo]

Using 3–5-mm. sections, the factors which influence growth in length of the leaf sheath of rice were studied. Sucrose was essential for growth in length. In the presence of 2% sucrose, auxins at a concentration which stimulates growth of coleoptile, inhibited the growth of the leaf sheath. The growth inhibition decreased from the basal to the upper part of the sheath.—D.B.

538 Wada, K. **On the three types of special vascular bundles of coleoptile in rice plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 283–5, bibl. 5, illus., English summary. [Dep. Agric. Tôhoku Univ.]

The 3 types of special vascular bundle in the rice coleoptile are named [by the author], short, cortical, and separated. They were differentiated, in this order, at the time of most rapid development of the embryo. The short and cortical bundles differentiated out from the cortical parenchyma ; the separated bundles branched off from the ordinary coleoptile bundles.—D.B.

539 Matsushima, S. and Manaka, T. **Crop-scientific studies on the yield forecast of lowland rice. 30. Tracing up developmental processes of young panicles on all individual tillers.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 299–302, illus., English summary. [Nat. Inst. Agric. Sci.]

540 Sato, K. **Studies on the starch content in the tissues of rice plant. 3. Effects of cutting leaf-blade and thinning panicle-branch at heading time on fruiting and on the amount of starch in the culm.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 286–7, illus., English summary. [Tôhoku Univ.]

By cutting off all the leaf blades at heading time, the fruiting percentage and the weight of the kernel were both lowered, and the grains harvested became very poor in quality. By thinning the panicle branches the effect was reversed. In the culms of plants deprived of leaf blades, starch diminished rapidly, and vanished completely within 2 weeks after the treatment, while in the culms of the plants in which the panicle branches were thinned, there remained abundant starch. This fact indicated lack of space in the kernel tissues to receive and store the substance.—Revised extract.

541 Ishizuka, Y. and Tanaka, A. **Studies on ecological characteristics of rice plant grown in different localities, especially from standpoint of nutrio-physiological character of plant. 1. Outline of morphological growth process of rice plant in different localities in reference to its climatic environment.** [Japanese] *J. Sci. Soil, Japan* 1956, **27**, No. 1, 1–6, bibl. 9, illus., English summary. [Hokkaido Univ.]

Rice plants, grown at 8 experiment stations from north to south Japan and cultivated under the same conditions except for climate, separated out as two types : (1) the cool-area type at Hokkaido and (2) the warm-area type at Chugoku, Shikoku and Kyushu. 1. At Hokkaido, the soil temperature at transplanting is very low ; ear primordia form as a response to [a rising] temperature ; tillering continues after ear-initiation ; and nutrition is sufficient to keep the lower leaves alive even towards the end of the growth period. 2. The temperature at transplanting is high and it is as a response to photoperiod that the ear-primordia are laid down ; tiller formation is vigorous during early stages of growth and attains a maximum 2 weeks before ear primordia are initiated ; lower leaves die towards the end of growth as a result of malnutrition. The southern limit of the cool-area type is Tôhoku and the northern limit of the warm-area type is assumed to be the Honshu-Nangan line. The area between these limits is regarded as a transition zone. The limits of the 2 types move within the transition zone according to the weather in any particular year.—From English summary.—D.B.

542 Ishizuka, Y. and Tanaka, A. **Studies on ecological characteristics of rice plant grown in different localities, especially from standpoint of nutrio-physiological character of plant. 2. Nutrio-physiological characters of seedlings and transplanting densities and their connection with process of growth after transplanting.** [Japanese] *J. Sci. Soil, Japan* 1956, **27**, No. 2, 47–9, bibl. 2, illus., English summary. [Hokkaido Univ.]

Different temperatures at transplanting time in different parts of Japan have resulted in the development of different transplanting techniques for the cool and the warm areas. The cool-area

type of rice plant experiences difficulty in survival on transplanting and is planted at a high density which favours more vigorous growth in the early than in the later stages of development. The warm-area type, transplanted at a higher temperature, is planted at a low density to assist growth during its later stages when it is liable to suffer from lack of nutrients. [See also Abs. 541 and 543.]—From English summary.—D.B.

543 Ishizuka, Y. and Tanaka, A. **Studies on ecological characteristics of rice plant grown in different localities, especially from the standpoint of nutrio-physiological character of plants. 3. Nutrio-physiological characteristics of growth process of rice plant in different localities.** [Japanese] *J. Sci. Soil, Japan* 1957, **27**, No. 3, 95–9, bibl. 7, illus., English summary. [Hokkaido Univ.]

The nutrient status of the cool- and warm-area types of rice (Abs. 541 and 542) was investigated and the results were used to explain the morphological and physiological differences in these two types. 1. Cool-area type. Seedlings had high levels of N, P and K at the time of transplanting (as a result of manurial treatment during the seedling stage) and were thus equipped to survive the period during which they were unable to absorb nutrients from a low-temperature soil. After recovery, N absorption increased and tillering began. When soil temperature increased, ear primordia were initiated, also, P together with other elements, became more available to the plant ; tillering thus continued after initiation of ear primordia and until the level of N in leaf and stem fell below 1·6%. At flowering the levels of N and P in leaf and stem were high and these elements were transferred to the ear. 2. Warm-area type. At the time of transplanting, the levels of N, P and K were lower than in the cool-area type, but, since soil temperature at transplanting was sufficiently high, nutrient absorption by the seedling was not interrupted and P and other elements were more available to the plant. The N level fell at an early stage to below 1·6% and at ear initiation to 1%. Since there was but little storage of nutrients in leaf and stem the nutrients in the ear were those absorbed by the plant after flowering. A shortage of nutrients at that stage can, therefore, seriously reduce yields in warm areas.—D.B.

544 Ishizuka, Y. and Tanaka, A. **Studies on ecological characteristics of rice plant grown in different localities, especially from standpoint of the nutrio-physiological character of plant. 4. Studies on physiological relationship between dying of lower leaves and the grain-straw ratio.** [Japanese] *J. Sci. Soil, Japan* 1956, **27**, No. 4, 145–8, bibl. 3, illus., English summary. [Hokkaido Univ.]

545 Arikado, H. **Studies on the development of the ventilating system in relation to the tolerance against excess-moisture injury in various crops. 7. Comparative studies on the ventilating pressure in lowland and upland rice plants growing under flooded and under water-economized conditions. 8. On the ventilating system and the ventilating pressure in various plants growing on lowland and on upland.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 289–93, illus., English summary. [Mie Univ.]

Lowland rice plants had a highly developed ventilating system, whatever the habitat. Upland rice plants had a feebly developed one when growing under dry conditions, but they were able to adapt themselves to moist conditions by renewing the root system and increasing the ventilating system.—D.B.

546 Huguet, F. and Bordas, J. La fumure azotée du riz. [**The nitrogen manuring of rice (in France).**] *Bull. tech. Inform.* 1956, No. 109, 229–33, bibl. 9.

547 de la Fuente, R. K. and Velasco, J. R. **Foliar fertilization of rice plants with nitrogen.** *Philipp. Agriculturist* 1955, **39**, No. 4, 192–203, bibl. 10. [Cent. Exp. Sta., Univ. Philipp., Laguna, Philippines]

During the vegetative stage of the rice plants, urea fertilizer as a foliar spray was less effective than as a soil top-dressing. Urea top-dressing in turn was less effective than a top-dressing of ammonium sulphate. During the booting stage, urea spray on the leaves was as effective as a top-dressing of ammonium sulphate.—From authors' abstract.

548 Dias, G. R. W. **Implemental and mechanised methods of rice production in Ceylon.** *Trop. Agriculturist* 1956, **112**, No. 1, 53–9.

GENERAL

549 Åberg, E. Höstsädens såningstid. 2. Såtidsförsök i höstsäd vid Lantbrukshögskolan 1945–1952. [**The time for sowing winter cereals. 2. Sowing-time experiments with winter cereals at the Royal Agricultural College, Uppsala, 1945-52.**] *Medd. 51 Stat. JordbrFörsök* 1955, 29–37, bibl. 3, English summary.

The material comprised winter wheat, winter rye and winter barley, and the experiments were located at Ultuna in Middle Sweden. It was found that winter wheat should preferably be sown during the first two weeks of September, winter rye during the first ten days of September and winter barley during the last week of August or the very first days of September. It was also found that the development of the plants during the autumn is of very great importance for their overwintering. Very early sowing results in a well developed stand of plants which are liable to attack and damage from *Puccinia*, *Fusarium*, *Typhula* etc., especially in warm and wet autumn weather. After late sowing the plants develop too slowly to give a good stand before winter comes and this generally results in poor development and low yield. Experiments continue with a view to determining what factors influence the overwintering capacity of winter cereals.—From author's summary.

550 CHURCH, B. M. **Cereal varieties grown in England and Wales, 1952-54.** *J. nat. Inst. agric. Bot.* 1956, **7**, No. 3, 474–80, bibl. 4. [Rothamsted Exp. Sta., Harpenden, Herts]

551 DERICK, R. A. and others. **Recent new varieties of cereal crops.** *Agric. Inst. Rev.* 1956, **11**, No. 6, 17–19, 24, illus. [Exp. Fms Serv., Canada Dep. Agric., Ottawa]

Brief descriptions of varieties recently licensed for sale in Canada, their origin and possible range of adaptation are given. The crop varieties considered are : Clintland, Shield and Vicar oats ; Herta, Parkland, Hudson and Nord barley ; Tetra Petkus winter rye ; the flax variety Wiera ; and the field bean varieties Lapin and Pinto.—M.P.

552 SHEBESKI, L. H. **The effect of wild mustard removal by MCP or 2,4-D at various stages of growth of wheat, oats or barley.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 25–6. [Univ. Manitoba, Winnipeg]

Experiments are described in which flax, wheat, oats or barley were grown alone or in association with 10, 25, 50, 100, 200 and 400 plants of *Sinapis arvensis* per sq. yd. In flax, as few as 10 plants per sq. yd. reduced yields by 60% in two years' tests. With wheat or barley at least 50 plants and with oats at least 25 were required before yield reductions were measurable. Other experiments, in which wheat, oats and barley were sprayed 19, 29 and 35 days after emergence, showed that competition from *S. arvensis* became noticeable after 29 days but the full damage was done within 6 days. A comparison of the effects of MCPA and 2,4-D at 4 oz. per acre on oats at five stages of growth showed that, while oats are susceptible to 2,4-D at the 4-leaf stage but not at the shot-blade stage, the weeds will have done all their damage by the latter stage. It is recommended that MCPA be used rather than 2,4-D.—*Weed Abstr.* 5 : 910.

[The data in this paper are also contained in Friesen, G. (Abs. 395) and Shebeski, L. H. *Proc. 8th W. Canad. Weed Contr. Conf.* 1955, pp. 40–3.—Ed.]

553 GRANSTRÖM, B. Ogräsbekämpning i vårsådda grödor. **Weed control in spring-sown crops.** *Medd. 65 Stat. JordbrFörsök* 1956, 5–17, English summary.

Trials of weed control in cereals and peas are discussed with special reference to the use of MCPA and dinitro compounds. The results can be summarized as follows. The composition of the weed flora varies in different parts of the country. The weeds in the north of Sweden are hard to control, partly because cruciferous weed spp. are relatively rare. An increased use of dinitro compounds is recommended. The product phenoxylene plus is promising among the tested herbicides containing MCPA. The most suitable time for treatment is 10–14 days after the appearance of spring-sown cereals. Late treatment must be compensated for by using an increased amount of the herbicide. The increase in yield after treatment with MCPA is proportional to the number of weed plants per sq. metre.—Author's summary.

554 RODGER, J. B. A. **The causes of lodging in cereal crops.** *Agric. Rev. Lond.* 1956, **2**, No. 7, 23–6, bibl. 14.

A summary is given of the main information on the subject.—M.P.

555 HEYLAND, K.-U. Untersuchungen über den Verlauf der Einlagerung von Gerüstsubstanzen im Getreidehalm, im besonderen Hinblick auf die Standfestigkeit. [**Investigation on the course of deposition of skeletal tissue in the stalk of cereals, with special reference to resistance to lodging.**] *Z. Acker- u. Pflbau* 1956, **101**, No. 3, 335–46, bibl. 27, illus. [Landw. Hochsch. Stuttgart-Hohenheim, W. Germany]

This is an anatomical study of the laying down of cellulose and lignin in the lowest internode of the stalk of three varieties each of winter wheat, spring wheat and winter rye. Cellulose deposition begins in the sclerenchyma tissue of the outer ring of vascular bundles and spreads to the sclerotic band, the inner vascular bundles and finally to the parenchymatous ground tissue. The deposition begins as the ear appears and proceeds rapidly in wheat but more slowly in rye. Varietal differences in cellulose deposition were obvious at ear emergence and were more distinct in rye

than in wheat. Differences in nutrition had little effect. Lignification takes place first in the sclerenchymatous tissue of the vascular bundle, extends to the sclerotic band and the epidermis, and, later, to the cortex. The ground parenchyma is scarcely lignified at all. The rate of lignification was greatest in varieties resistant to lodging. N slowed down the process. The relationship between rate of lignification and the time interval between spike emergence and flowering is discussed.—D.B.

556 Pelshenke, P. F. and Drews, E. Die Qualität von Getreide und Getreideerzeugnissen in Abhängigkeit von der Phosphatversorgung der Getreidepflanzen und dem Kalkzustand des Bodens. [**The dependence of grain quality and grain products on phosphate supplies to the cereal plants and the calcium status of the soil.**] *Landw. Forsch.* 1956, **9**, No. 3, 184–95, bibl. 48, English summary. [Bundesforschungsanstalt für Getreideverarbeitung, Detmold, W. Germany]

557 Grosse-Brauckmann, E. Die Kieselsäureaufnahme von Getreide unter dem Einfluss von Stickstoff, Kalk und Phosphorsäure. [**The influence of nitrogen, lime and phosphoric acid on the intake of silicon by cereals.**] *Landw. Forsch.* 1956, **9**, No. 3, 196–203, bibl. 8, English summary. [Univ. Bonn, W. Germany]

558 Church, B. M. **Cereal manuring in England and Wales.** *J. Sci. Fd Agric.* 1956, **7**, No. 11, 711–21, bibl. 11, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

Information on the manuring of cereals obtained from fertilizer-practice surveys (1950–4) is presented. More than a third of the cereal acreage in England and Wales received no N fertilizers, and the average dressings given were 0·25–0·35 cwt. N per ac., compared with a calculated optimum dressing of 0·6 cwt. N per ac. Average K dressings were about optimal (0·3 cwt. K_2O per ac.) but P fertilizers were used on much of the cereal acreage at rates above the optimum (0·1–0·3 cwt. P_2O_5 per ac.). Profitable increases in the use of N on that part of the cereal acreage which receives little or no N would increase the total cereal yields of England and Wales by about 6%.—From author's summary.

LEGUMES

SOYABEANS

559 Bernard, R. L. and Cartter, J. L. **Five years of tests of soybean varieties for Illinois.** *Circ. 760 Illinois Agric. Exp. Sta.* 1956, pp. 12, illus.

Seed yields, seed quality, protein- and oil-contents, plant heights, lodging tendencies and relative rates of maturity are reported for 21 varieties of soyabean in Illinois.—M.H.F.

560 Gutiérrez, D. R. Contenido de aceite y proteína y respuesta al abonamiento de ocho variedades de soya. [**Oil- and protein-contents and response to manuring of eight soyabean varieties.**] *Acta agron., Palmira* 1955, **5**, No. 4, 211–21, bibl. 7, English summary.

561 Sato, T. and Kamiyama, K. **Studies on seed production of soybean. Experimental researches of the effects of differences in the altitudes of producing localities upon the seeds and their progeny plants.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 317–18, bibl. 2, illus., English summary. [Kanto-Tosan Agric. Exp. Sta.]

The altitudes at which the seeds were produced lay between 80 and 1350 m. Within a given variety, differences in the size of seed were due to edaphic rather than climatic conditions. The higher the altitude, the earlier was the flowering and seed maturity and the lower was the fat content.—D.B.

562† Makodzeba, I. A. and Podoprigora, V. S. [**A promising preparation for the control of grass weeds.**] [Russian] *Zemledelie* (*Agriculture, USSR*) 1956, **4**, No. 5, 119–20. [Ukrainian Res. Inst. Grain Husb.]

Isopropyl trichlorophenylcarbamate was applied at 0, 2 and 4 kg. in 500 l. of water/ha. on the day of sowing soyabeans to which cereal weeds [*Setaria* sp. and *Echinochloa crus-galli*] were added. Four weeks after sowing, the monocotyledonous weeds were reduced to 40% of control at the 4 kg. rate ; the action on dicotyledonous weeds was weaker and no injury to the soyabeans was observed. In a 2nd experiment the herbicide was applied before working the fallow and the effects were studied after 37 days. The 4 kg. quantity reduced the monocotyledonous weeds to 18% of control.—J.F.C.

563 Staniforth, D. W. and Weber, C. R. **Effects of annual weeds on the growth and yield of soybeans.** *Agron. J.* 1956, **48**, No. 10, 467–71, bibl. 7, illus. [Iowa Agric. Exp. Sta., Ames]

Over a 3-year period, various sown and natural infestations of yellow foxtail (*Setaria lutescens*), smartweed (*Polygonum pennsylvanicum*) and velvet

leaf (*Abutilon theophrastii*) were grown with soyabeans and removed at several stages of bean growth during the season. Dry-matter yield of above-ground plant parts of weeds and soyabeans, together with seed yield, plant height, maturity and lodging of soyabeans were obtained. In a total of 15 experiments, seed-yield reductions averaged 3·7 bu. per ac. or 10% of weed-free beans, when weeds were not removed. Yield reductions were roughly proportional to the amount of growth made by weeds. In general, foxtail infestations reduced bean yields slightly less than smartweed or velvet leaf. The presence of weeds delayed maturity about 1 day, decreased height by 2 in. and increased lodging by 2–6%. The effect of environmental factors is also discussed. —From authors' summary.

564 Clark, J. A. and Levitt, J. **The basis of drought resistance in the soybean plant.** *Physiol. Plant.* 1956, **9,** No. 4, 598–606, bibl. 4, illus. [Bot. Dep., Univ. Missouri]

565 Nelson, L. E. **Response of soybeans grown in the greenhouse to zinc applied to a black belt soil.** *Soil Sci.* 1956, **82,** No. 4, 271–4, bibl. 7. [Black Belt Br. Exp. Sta., Brooksville, Mississippi]

566 Orbea, J. R. Efecto del "mulch" en el rendimiento de la soja (*Glycine max*). [**Effect of mulch on soyabean yield.**] *Rev. Fac. Agron., La Plata* 1955, **31,** No. 2, 337–40, bibl. 4. [Received June, 1956]

In a plot trial, in which 10 soyabean varieties were sown on 15 October and cut on 19 January, a mulch of dry grass, approximately 25 cm. thick, applied between the soyabean rows, increased the green-matter yields by 52–345% according to variety, compared with the yields from the plots which received no mulch.—E.B.O.

GROUNDNUTS

567 Canecchio, V. Amendoim da sêca. Épocas de plantio. [**Dry-season groundnuts. Sowing time.**] *Bragantia* 1954–5, **14,** Note 7, 23–4, English summary. [Received July, 1956]

In 2 trials carried out in São Paulo, Brazil, in 1953–4, to determine the best sowing time for dry-season groundnuts, 5 sowing dates were compared: 1 and 15 Feb., 1 and 15 March and 1 April. In both trials, the plots sown on 1 Feb. yielded more than those sown on 15 Feb. Later sowings gave no yields.—From summary.

568 Negi, L. S. and Dalal, J. L. **Farmers can get more groundnut per acre.** *Indian Fmg* 1956, **6,** No. 6, 11–13. [Groundnut Exp. Sta., Samrala, Punjab]

By using improved measures, the average yield of groundnuts at Samrala increased from 11·4 maunds of pods per ac. [1 maund = 82·3 lb.] in 1949 to 32·7 in 1954. Over this period the average was 15·2, while the State average was 8·4. The use of improved varieties gave 10 to >40% increases. Punjab No. 1 which yields on an average 2–3 maunds more than Samrala local, is the recommended variety. Seed treatment with 1% ceresan at 5 oz. per 100 lb. for the control of collar rot gave 20–30% yield increases. In spacing trials, using rows 12 in. apart, 9 in. between plants gave a 52% increase over the customary 24 in. at Samrala, and, on farms during 1954–5, a 47% increase. Applied as $(NH_4)_2SO_4$, 25 lb. N per ac. gave the most economical results, the yield being 21% higher than the control.—J.F.C.

569 Seshadri, C. R. and others. **Groundnut —mixed cropping experiment.** *Madras agric. J.* 1956, **43,** No. 10, 496–504, bibl. 3. [Oilseeds Sect., Dep. Agric., Madras]

A spreading and a bunch variety of groundnut were grown alone or intercropped with one of the following: castor [*Ricinus communis*], cholam [*Sorghum* sp.], cotton, redgram [*Cajanus indicus*], tenai [*Setaria italica*], or cumbu [*Pennisetum typhoideum*]. Intercropping, particularly with cholam, depressed the yields of the spreading groundnut more than that of the bunch variety, but the latter caused the greater depression in yield of the accompanying crop. Intercropping was, however, an economic proposition and the best mixtures were spreading groundnuts with redgram, cotton or castor.—M.P.

570 Tourte, R. and Fauché, J. La "rosette" de l'arachide. 1. Influence de la densité de semis. 2. Incidences sur la proportion de gousses vides à la récolte. [**Groundnut rosette disease. 1. Influence of seed rate. 2. Incidence on the proportion of empty pods at harvest.**] *Bull. agron.* 13 *Fr. d'out. mer* 1956, 155–61. [Cent. Rech. Agron., Bambey, Senegal]

571 Tardieu, M. Étude morphologique sur les fleurs d'arachide. [**A morphological study on groundnut flowers.**] *Bull. agron.* 13 *Fr. d'out. mer.* 1956, 113–17, bibl. 5, illus. [Cent. Rech. Agron., Bambey, Senegal]

572 Shibuya, T. and Suzuki, M. **Morphological and physiological studies on subterranean fructification of legume crops. 5. Occurrence of abortion of**

fertilized-seed in peanut. [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **25**, No. 1, 17–18, illus., English summary. [Hokkaido Univ.]

Abortion of the fertilized ovule occurred more frequently in the Virginia than in the Spanish variety of *Arachis hypogaea*. It also occurred more frequently in the upper than in the lower ovule and within 10 days of the gynophore penetrating the soil. After a microscopic examination, the cause was attributed to malnutrition of the ovule.—From authors' summary.

573 MAISTRE, J. Contribution à l'étude de la nutrition minérale de l'arachide (*Arachis hypogaea*). La carence borique et ses effets. [**A contribution to the study of the mineral nutrition of groundnuts (*A. hypogaea*). Boron deficiency and its effects.**] *Agron. trop., Nogent* 1956, **11**, No. 3, 310–60, bibl. 8, illus., English and Spanish summaries.

The threshold of B deficiency in groundnuts is slightly above 0·005 ppm. of B in the nutrient solution. Symptoms of B deficiency are : retarded growth, formation in the leaflets of thickened areas of an olive-green colour which may lead to leaf deformation, and inhibition of flowering. A B content in the leaves lower than 25 ppm. indicates a deficiency of this element in the nutrient solution. This deficiency causes an increase in P content and a decrease in Ca content in the leaves, thus changing the K-Ca-Mg equilibrium ; in the leaves/stems as a whole, it influences the absorption of all the macro-elements, changing, mainly, the N-P-K equilibrium.—E.B.O.

574 HUBER, A. **Some observations on the correlated influence of fertilizers on peanut yields and vegetative development of the plants.** *Plant and Soil* 1956, **8**, No. 2, 126–31, bibl. 6, illus. [Faculty of Agric., Rehovot, Israel]

Virginia Bunch groundnuts were grown in sandy loam subsoil in containers and treated with $(NH_4)_2SO_4$ at 150 kg./ha., triple superphosphate at 50 and 150 kg./ha. and KCl at 30 and 150 kg./ha, singly and in combination. Positive correlations were found between pod and haulm yields, between pod yield and number of nodules, and between haulm yields and nodule numbers. The effect of N on yields, root length and especially on nodule numbers was negative when it was applied alone, but when combined with P, yields were increased.—J.F.C.

575 RICH, C. I. **Manganese content of peanut leaves as related to soil factors.** *Soil Sci.* 1956, **82**, No. 5, 353–63, bibl. 8, illus. [Virginia Agric. Exp. Sta., Blacksburg]

576 DUERDEN, J. C. and others. **The persistence and toxicity of insecticides under tropical conditions. 1. The persistence of γ BHC and its toxicity to *Tribolium castaneum* (HBST.).** *Bull. ent. Res.* 1956, **47**, No. 4, 797–801, bibl. 2. [W. Afr. Stored Prod. Res. Unit, Lagos, Nigeria]

To maintain control of *T. castaneum* in groundnut warehouses in Kano, Northern Nigeria, weekly applications of BHC, at the rate of approximately 20 mg. per sq. ft. of sack area, are required.—E.B.O.

577 AMARO, J. P. P. Contribuição para o estudo da luta contra as pragas do amendoim armazenado na Guiné. 1. Fumigação. [**A contribution to the study of pest control in groundnuts stored in Portuguese Guinea. 1. Fumigation.**] *Garcia de Orta, Lisboa* 1955, **3**, No. 3 and 4, 329–38 and 445–70, bibl. 27, illus., French summary.

Methyl bromide is recommended for controlling pests in groundnuts. In one method of application tested, 150 sacks of groundnuts were fumigated in a chamber at atmospheric pressure with methyl bromide applied at the rate of 24 g. per cu. m. for 24 hr. ; this gave 100% mortality of the pests, the principal of which were *Pachymerus acaciae* and *Tribolium* spp.—E.B.O.

PEAS

578 HAMSON, A. R. and others. **Recommendations for the production of peas.** *Ext. Bull. 942 Cornell Agric. Exp. Sta.* 1955, pp. 14, illus.

Types of soil, fertilization, seed treatment, methods of sowing, cultivation, irrigation, and control of weeds, insect pests and diseases are discussed. For fertilizer placement, placing the fertilizer in bands 2 in. to the side and from 1 to 1·5 in. deeper than the seed was found to be best. Spergon, which in some cases has caused a 50% increase in germination, is recommended for seed treatment. For weed control, pre-emergence application of dinitro compounds, sinox P.E. or Dow premerge at 3 lb. of active ingredient per acre, is recommended when the peas are not sown in hay or pasture mixtures. When the peas are used as a nurse crop for legumes, the chemicals should be applied when the peas are 3–6 in. tall, and at rates depending on the temperature, e.g. 1·5 lb. of P.E. or premerge at 60°F. and 0·75 lb. at 80°F.—J.F.C.

579 ELIASSON, S. and DANELL, N. Blandsäd av

stråsäd och ärter. Sammanställning av resultat av jämförande försök med havre, korn, vårvete och ärter samt blandningar därav i södra och mellersta Sverige under åren 1947–1951. [**Cereals and peas and mixtures of these. A summary of results of comparative trials of oats, barley, spring wheat, and peas, as well as mixtures of these in South and Middle Sweden during the years 1947-51.**] *Medd. 68 Stat. JordbrFörsök* 1956, 55–82, bibl. 42, English summary.

The cereals used were oats (Sv. Guldregn II), barley (Maja), spring wheat (Sv. Diamant II), and the peas Hero marrowfat peas. The object of the trials, which were conducted in 16 places (mapped), was to determine the desirability of growing the cereals and peas alone or in mixtures. The content of peas in the mixtures was kept at 25% throughout. The growing of cereals in mixtures was not found to offer any advantage ; low-yielding grain types stand to gain from the mixture, but at the cost of the higher-yielding types. In mixtures, barley proved the most productive cereal, and when grown with the other cereals its proportion in the final crop was 30% greater than in the seeds mixture. Peas stood up well in the blended grain and on an average yielded 13% more in the final crop than their proportion in the seeds mixture. But although peas were favoured by cultivation with cereals, it was at the expense of the latter, and only in two areas was the advantage at all marked. Detailed findings are presented as to the effect of the different mixtures upon straw harvest, grain size, thousand-grain weight, content of grain, crude-protein content, yield of crude protein, earliness or otherwise, and strength of straw in the different plants.—G.M.R.

580 Toniolo, L. Germinabilità, vitalità ed anormalità di germinazione in *Pisum sativum* e *Phaseolus vulgaris*. [**Germinating capacity, viability and abnormal seedlings in *Pisum sativum* and *Phaseolus vulgaris***.] *Ann. Sper. agr.* 1956, **10**, No. 3, 923–56, bibl. 51, illus., English summary. [Ist. Agron. Gen., Univ. Padova, Italy]

In the trials described, the results of germination tests in the laboratory using (a) Petri dishes ; (b) rolled papers ; and (c) earth boxes and the tetrazolium method for testing viability were compared with field emergence. Separate tabulated results are given for each trial. The general conclusion was that there was sufficient agreement between germination in the laboratory and that in the field, germination in Petri dishes being the most suitable for peas, and germination on rolled papers and in earth boxes the most suitable for beans, but, for both species, the tetrazolium method gave the best results. By this method the seeds can be divided into different groups of abnormality according to differences in colour.—E.B.O.

581 Highkin, H. R. **Vernalization in peas.** *Pl. Physiol.* 1956, **31**, No. 5, 399–403, bibl. 10, illus. [Earhart Pl. Res. Lab., Biol. Div., California Inst. Technol., Pasadena]

The inductive effect of cold treatment at 4–7°C. on flowering in peas (*Pisum sativum*) was studied. It was found that the 2 late varieties, Unica and Zelka, are normally vernalizable with respect to both flower formation and vegetative development and that these 2 phenomena are distinct. A pretreatment during germination at 20 or 26°C. for up to 5 days before the optimal cold treatment resulted in a progressive loss of ability to be vernalized. The plants remained vernalizable for up to 3 days at 20°C. At 26°C. they remained vernalizable for only 1 or 2 days. Pretreatment at either temperature had no effect on vernalization with respect to vegetative development.—From author's summary.

BEANS

582 Petronici, Clara. Contributo alla conoscenza del metabolismo azotato nelle piante : variazioni degli aminoacidi liberi e totali nella fava (*Vicia faba major*) durante il ciclo vegetativo. [**A contribution to the knowledge of the nitrogenous metabolism in plants : variations in free and total amino acids in beans (*Vicia faba* var. *major*) during the vegetative cycle.**] *Ann. Sper. agr.* 1956, **10**, No. 3, 841–55, bibl. 23, English summary. [Ist. Chim.-agr., Univ. Palermo, Italy]

583 Heinonen, S. and Waris, H. **The uptake of iron as ferric sequestrene by *Vicia faba* and *Phaseolus vulgaris*.** *Physiol. Plant.* 1956, **9**, No. 4, 618–23, bibl. 12. [Bot. Inst., Univ. Helsinki]

The ability of these plants to take up iron from solutions with and without EDTA (sequestrene) was investigated by analyzing the exudates from the cut stems. When the concentration of inorganic Fe was high enough there was no difference in uptake from the chelated Fe. There was some evidence that chelated Fe passed into the sap.—From authors' summary.

LUPINS

584† Maĭsurjan, N. A. and Filatov, N. K. [**Means of accelerating the ripening of lupin.**] [Russian] *Izv. Timirjazevsk. seljsk.*

Akad. (*Bull. Timirjazev agric. Acad.*) 1956, No. 2 (12), 37–52, bibl. 25.

The growing of southern crops in the northern regions of the non-chernozem belt is an outstanding problem in the Soviet Union. The use of sweet lupin as fodder and green manure is of significance in this connexion. The main obstacle to the wider use in the USSR of sweet lupin is its poor production of seed. Sowings for seed are concentrated mainly in western and south-western regions of the non-chernozem belt. The need for measures which will hasten development and ripening in this crop induced the authors in 1953–5 to test the effect on seed production of: (1) applying P/K as fertilizer; (2) spraying the leaves with a solution of boron; (3) defoliation; and (4) vernalization. The tests were carried out on the experimental fields of the Timirjazev Agricultural Academy, near Moscow, where the plots (100 sq. m.) are located on medium podzol with a southern slope, and the weather (during 1953, –4 and –5) was variable in its effect on plant growth rates. Replication was 3-fold in 1953 and 4-fold in 1954 and 1955. The experimental material comprised *Lupinus angustifolius* var. Blue No. 173 bred at the Novozybovsk Selection Station, seed being produced on the Academy's fields, and treated before sowing with granosan (1·5 kg./ton dry seed). Inoculation was effected by mixing moist sawdust with nitragin and spreading the mixture on the soil during the pre-sowing cultural processes. The data for (1) indicate that PK at 30 kg. per plot (applied during 1953 in 2 doses, (a) at the 3–4 leaf stage, and (b) at budding; and applied during 1954 and 1955 with pre-sowing cultural measures) accelerated ripening by 2, 8 and 6 days in 1953, –4 and –5, respectively, without loss of seed quality. The data for (2) show that spraying with boron at the budding and flowering stages (in 1953 with a 0·5% solution of boric acid and in 1954 and 1955 with a 0·7% solution of borax, each at 500 l./ha.) either in the mornings or afternoon, accelerated ripening by an average of 9 days compared with the controls. Further, there is evidence that the number of pods on the main stem and of seeds per pod is increased by the boron treatments. With regard to (3) the defoliants tested were (a) a 15% concentration of calcium cyanamide (prepared 2 hr. before use) and (b) a 10% solution of caustic soda, each applied at 400 l./ha. at the stage of pod browning. While there is evidence that both defoliants hasten ripening (9 to 11 days earlier than the control) it is concluded that use of this measure is not justified because of a lowering in seed quality and/or quantity. The authors claim that defoliation with calcium cyanamide may be useful in reducing the work involved in the preparation of seed for storage because the defoliation rapidly lowers seed moisture (19% lower than the control, 8 days after treatment). While treatment (4) is usually the most effective means of hastening seed ripening, in lupin during vernalization there is excessive mould growth together with an increase in seed size and moisture content which complicates sowing techniques. From studies of treating the seed to overcome mouldiness, it is demonstrated that treatment with 1·5 kg. granosan/1 ton seed applied after seed soaking (to 90% moisture content) followed by vernalization (at 4°C. for 16–18 days) and subsequent drying to 20–24% moisture content, result in ripening 29 days earlier than the control. Finally a test in 1955 was designed to determine the effects of all the treatments combined, viz. the use of vernalized seed treated with granosan, PK manuring of the crop, spraying the leaves with boron and defoliation with 15% calcium cyanamide. The data show that the treatments resulted in seed ripening 22 days earlier than that of the control.—M.H.

585† Steveninck, R. F. M. van. **The occurrence of funnel leaflets and ring fasciations in yellow lupins.** *Ann. Bot., Lond.* 1956, **20**, No. 79, 385–92, bibl. 18, illus. [Dep. Sci. Ind. Res., Christchurch, N.Z.]

Funnel leaflets in yellow lupins (*Lupinus luteus*) were observed on a mutant, on pea-mosaic infected plants, and on plants treated with 2,4-D. The above phenomena have been discussed in the light of similar morphogenetic effects, reported to be induced in other plants by various growth substances. A possible explanation for the ring-shaped structures has been given by assuming a change in the influence of the apical meristem on developing leaf primordia and by considering the 'physiological field' concept for organ formation respectively.—Author's abstract.

BAMBARRA GROUNDNUTS

586 Escalante, M. G. *Voandzeia subterranea* (L.) Thouars. Una interesante leguminosa geocárpica introducida por la División de Exploraciones e Introducción de Plantas. [*V. subterranea.* **An interesting geocarpic legume introduced by the Division of Plant Exploration and Introduction.**] *Rev. Invest. agric., B. Aires* 1956, **10**, No. 1, 35–42, bibl. 7, illus.

Seed of *V. subterranea*, introduced into Argentina from Australia in 1951, germinated well. A morphological and histological description is given of this plant as well as notes on seed germination.—E.B.O.

GENERAL

587† Norris, D. O. **Legumes and the Rhi-**

zobium symbiosis. *Emp. J. exp. Agric.* 1956, **24,** No. 96, 247–70, bibl. 49. [CSIRO Pl. Soils Lab., Brisbane, Qd]

An examination of the evolution and present world distribution of species in Leguminosae suggests that the tropical legume is the typical one. The hypothesis is advanced that the cowpea type of nodule bacteria which is associated with tropical Leguminosae represents the ancestral condition and is the type of the genus Rhizobium. The rhizobium associated with such genera as *Pisum* and *Trifolium* is typical in having a high requirement of Ca for growth. A suggestion is advanced for replacing the concept of the cross-inoculation group by a Symbiotic Rating. The need to appreciate the true position in the Rhizobium symbiosis for an intelligent development of leguminous pasture plants in the tropics is stressed.—Author's summary.

588† Saric, Z. **The adaptation of the nodule bacteria under natural conditions.** *Rapp. Congrès int. Sci. du Sol, Vol. C.* Paris, 1956, 163–7, bibl. 1. [Inst. Pl. Breed. and Prod., Zemun-Polje, Yugoslavia]

An investigation was carried out to study the adaptation of rhizobia to the legumes *Lespedeza* sp., *Vigna* spp., *Arachis hypogaea*, *Glycine hispida* and *Phaseolus lunatus* grown for 4 generations in soil which lacked their normal rhizobia. Results showed that the rhizobia present in this soil were adapting themselves to the new host plants during the first 4 generations and that, in this process, they were undergoing cultural, morphological and physiological changes. This adaptation varied with plant species. Nodules were formed on *Vigna* spp. even in the 1st generation, while on *G. hispida* they were formed only in the 3rd and 4th.—E.B.O.

ROOTS

SUGAR-BEET

589 Baldoni, R. Prove sperimentali sulla coltura invernale della bietola. [**Trials on growing sugar-beet in winter.**] 1955, pp. 31. [Bari, Italy]

In trials carried out in 4 localities in southern Italy, the sugar-beet varieties Klein AA, Klein polybeta and Cesena NSA were sown at end–Oct., end–Nov. and end–Dec. and harvested on 27–30 May, 27–30 June and 27–30 July. The root- and sugar-yields, and the percentage of bolting, decreased with later sowing dates. The highest root- and sugar-yields were obtained from harvesting at the end of July. The average sugar yields and the percentage of bolting of the varieties tested were : Klein polybeta 3360 kg. per ha., 23% ; Klein AA 3080 kg. per ha., 5% ; Cesena NSA 3280 kg. per ha., 3% ; respectively.—E.B.O.

590 Cavazza, L. Esperimenti di coltura invernale della bietola da zucchero. [**Trials on growing sugar-beet in winter.**] 1955, pp. 28, illus. [Ist. Agron., Univ. Bari, Italy]

Six sugar-beet varieties were sown on 6 and 26 Oct., 23 Nov. and 13 Dec., 1954, and harvested on 28 June and 28 July, 1955. Results indicated that the yield of roots and sugar, and the percentage of bolting, decreased with later sowing dates. Harvesting in July gave higher yields of roots and sugar, on average, than harvesting in June. Klein polybeta, sown on 6 Oct. and harvested on 28 July gave the highest root yield, 38,400 kg. per ha., and the highest sugar yield, 7290 kg. per ha. Cesena NSA was the most resistant to bolting. It is thought that, under the conditions of these trials, the plant density should not be less than 10 plants per sq. m.—E.B.O.

591 Hanke, E. and Kaiser, H. Untersuchungen über den Einfluss eines künstlichen Windschutzstreifens auf den Ertrag von Zuckerrüben im Jahre 1954. [**The effect of an artificial windbreak on the yield of sugar-beet in 1954.**] *Z. Acker- u. Pflbau* 1956, **102,** No. 1, 81–100, bibl. 13, illus. [Wetteramt Essen, W. Germany]

The first part of the paper critically reviews earlier work. The second part records and statistically analyzes yields of tops, roots and % sugar from sugar-beet grown under the protection of a fence of coconut fibre which served as an artificial windbreak. On the leeward side of the windbreak, up to a distance of 18 times the height of the fence, the yield of roots and tops was 6–7% higher than on the exposed side of the fence. The increase in the percentage of sugar in the beet was lower. The experiments are to be continued.—D.B.

592 Great Britain. National Institute of Agricultural Botany. **Strains of sugar beet. Recommended list.** *Fmrs' Leafl. 5. (Revised) N.I.A.B.* 1956, pp. 4.

Brief notes are given of 8 recommended and 5 provisionally recommended strains of sugar-beet. The average results from strains on trial during 1953–5, in Great Britain, are tabulated.—M.P.

593 Willey, L. A. **Sugar beet trials : 1947–54.** *J. nat. Inst. agric. Bot.* 1956, **7,** No. 3, 592–6, bibl. 6.

A summary is given of the annual results of field trials of ' new ' strains of sugar-beet grown in England during 1947–54. Forty-eight strains were compared with Sharpe's Klein E as the control strain. Data include percentage of ' bolting' ;

yields of roots, sugar and tops ; sugar content, noxious N, purity and electrical resistance of the juice. Of the strains available commercially, Hilleshog E, Hilleshog N, Hilleshog Polyploid and Johnson's E received recommendations for growing in Great Britain.—From author's summary.

594 Bonciarelli, F. Confronto fra diverse varietà di barbabietole nella pianura di Foligno. [**Comparison between various sugar-beet varieties in the Foligno plain (central Italy).**] *Industr. saccar. ital.* 1956, **49**, No. 3–4, 56–60.

In a field trial carried out in 1955, 12 sugar-beet varieties were sown on 4 Apr. and harvested on 7 and 26 Sept. Results showed higher yields of roots and sugar from the beets lifted on the later date. The varieties Desprez TM, Maribo P and Pedigree yielded best with 9950, 9740 and 9510 kg. of sugar per ha. (average of the 2 harvests). [See also *Fld Crop Abstr.* 9 : 486.]—E.B.O.

595 Miranda, J. and Bernaldo, A. G. Registro de variedades de plantas. Ensayos comparativos de variedades de remolacha azucarera 1954. [**Register of plant varieties. Comparative trials with sugar-beet varieties in 1954 (in Spain).**] *An. Inst. nac. Invest. agron.* 1955, **4**, No. 2, 485–530.

596 Zucchini, M. Il seme di barbabietola ed i progressi della coltura. [**The seed of sugar-beet and the progress of this crop (in Italy).**] *Ital. agric.* 1956, **93**, No. 5, 426–34, bibl. 3, illus.

Information is given on sugar-beet varieties grown in Italy.—E.B.O.

597 Rabbethge, M. Technik und Betriebswirtschaft des Zuckerrübensamenbaues in Westdeutschland. [**The technique and farm economics of sugar-beet seed production in Western Germany.**] *Landw.-ang. Wissensch.* 1956, No. 52, pp. 125, bibl. 88, illus., English and French summaries. [Inst. f. landw. Betriebslehre, Göttingen, W. Germany]

This is a literature review on the production of sugar-beet seed, its historical development, distribution in Western Germany, place in the farming system, economic importance, and the cultivation technique. This last aspect of the subject [not summarized in the English or French summaries] covers the most important varieties, nutrient and fertilizer requirements, sowing and care of the stecklings, harvesting and overwintering of the stecklings, planting and care of the seed-bearing plants, and harvesting of the sugar-beet seed. [For manurial treatment see Abs. 598.]—D.B.

598 Rabbethge, M. Das Nährstoff- und Dungebedürfnis des Zuckerrübensamenbaues in Westdeutschland. [**Nutrient and fertilizer requirements of sugar-beet grown for seed production in Western Germany.**] [Contained in] *Landw.-ang. Wissensch.* 1956, No. 52, 20–3, bibl. 5, illus. [Inst. f. landw. Betriebslehre, Göttingen, W. Germany]

The stecklings and seed bearers have different fertilizer requirements. For stecklings, the general principle is to reduce N and increase P_2O_5 (which improves storing qualities) and to apply N before cultivating the land. It is recommended that N be given as a slow-acting fertilizer such as ammonium sulphate or calcium cyanamide (though in practice it is often given as saltpetre plus an ammonium compound), P as superphosphate and K as a 40% K salt. The best ratio is 1 : 1·3 : 1·8. On good soils N can be dispensed with. Early autumn is the time for applying farmyard manure, the upper limit being 120–150 dz./ha. Lime is applied according to the soil requirements. A top-dressing of manure should be given only when growth is feeble. If correctly manured, the fields of stecklings readily stand out against the fields of beet grown for sugar by the light-green of their leaves in autumn. The seed bearers require heavy applications of farmyard manure, given early, at the time of autumn ploughing, and supplements of mineral fertilizer. Up to 125 kg. N/ha. can be given if P and K are present in sufficient quantities. In a balanced fertilizer, the nutrients NPK would be present in the ratio 1 : 1 : 1·5 and given in the same compounds as for the stecklings. A reduction in the proportion of P_2O_5 results in lower seed yields and poorer seed quality. Spray irrigation, correctly timed, has proved to be very good for beet-seed production. Spraying at the beginning of flowering resulted in yield increases of from 10 to 20%, but too early spraying resulted in a 10–20% reduction in yield. Therefore, even in a dry spell it is inadvisable to spray before flowering.—D.B.

599 Stracke, W. Zur Frage der Feldüberwinterung von Rübensamen-Stecklingen. [**Concerning the over-wintering of beet-seed stecklings in the field.**] *Dtsch. Landw.* 1956, **7**, No. 9, 426–8, bibl. 7, illus. [Inst. Acker- u. Pflbau, Fr. Schiller Univ., Jena, E. Germany]

For seed production of sugar-beet, Heinisch [see *Fld Crop Abstr.* 6 : 1005] recommended late-summer sowing and overwintering of the stecklings in the field instead of storing them in a clamp. The success of this method requires measures for winter protection and sufficient growth before winter. On heavy soils in dry districts, the beets are often winter-killed. The variable success of

late-summer sowing is ascribed to difficulties in seed-bed preparation. During 1953–5, the adoption of earlier (i.e. spring) sowing and the use of cover-crops were tested. Spring-sowing on a well prepared seed-bed guaranteed uniform germination and produced hardy plants. The beet seed should be sown at 15 kg./ha. midway between the cover-crop rows, preferably using a special drill for simultaneous sowing. Finger- to thumb-sized plants with 7–10 leaves were found to be safest for overwintering. For the beets to reach this stage, summer barley proved to be a better cover-crop than oats or peas.—J.F.C.

600 Flamini, B. and Spreafico, L. L'analisi della germinabilità nei glomeruli di barbabietola. Seconda nota : Confronto fra diversi metodi di analisi. [**The analysis of the germinating capacity of sugar-beet seed-clusters. 2. Comparison between different methods of analysis.**] *Sementi elette* 1956, **2**, No. 7, 38–58, bibl. in text, illus. [Ist. Agron., Univ. Bologna, Italy]

As a result of 2 trials, sand germinators are recommended for determining the germinating capacity (number of sprouts produced) and germinating energy of sugar-beet seed-clusters. These germinators gave more constant results than other types tested, including the terracotta germinators. [See *Fld Crop Abstr.* 10 : 165.]—E.B.O.

601 Hall, C. W. **Drying temperatures and storage problems of sugar beet seeds.** *J. Amer. Soc. Sug. Beet Technol.* 1956, **9**, No. 2, 161–6, bibl. 1, illus. [Michigan State Univ., East Lansing]

Samples of seeds (approximately 10 g.) were placed in glass containers in which relative humidities of 53, 75 or 90% were maintained by salt solutions. These containers were then kept at 40, 60, 85 and 100°F. The resulting equilibrium moisture content of the seeds was higher at the lower temperatures and higher relative humidities. In removing excess moisture by heated air, 110°F. is the maximum temperature if the seeds are exposed for more than 1 hr., the exposure time being dependent on moisture content and air flow. The coefficient of friction was also studied, and was found to be considerably higher than for common cereal grains.—G.M.W.

602 Gojmerac, W. L. **Effects of insecticides on germination and emergence of sugar beets under greenhouse conditions.** *J. econ. Ent.* 1956, **49**, No. 5, 710–1, bibl. 1. [North Dakota Agric. Exp. Sta., Fargo]

603 Wort, D. J. and White, G. A. **Chemical and biochemical responses of the mature sugar beet root to defoliation by frost and knife.** *Canad. J. Bot.* 1956, **34**, No. 5, 777–92, bibl. 10, illus. [Univ. Brit. Columbia, Vancouver]

Experiments were conducted to discover whether there was a loss of sucrose following the killing of the tops of the sugar-beet by frost or by removing the tops by cutting, this cutting being followed in one series by regrowth of tops, and in the other series by repeated cutting to remove regrowth. Changes in sugar content and the accompanying chemical changes in the root were studied at time intervals of from 1–16 days after the original defoliation. Compared with controls, all 3 treatments to the tops affected the chemical changes and most of the enzyme activities in a similar way. There was a highly significant decrease in dry weight. Percentage sucrose, on a fresh-weight basis, decreased steadily and was significantly lower than in the controls. The conversion of percentage sucrose to a dry-weight basis revealed that the various treatments had not resulted in a real sucrose loss. Invert sugar increased in all the beets and was significantly higher in the treated than in the control beets. The content of starch-dextrin and of total- and soluble-N were not appreciably changed. The activity of catalase and phosphorylase was lower, and of phosphatase and invertase higher, in treated than in untreated plants.—D.B.

604 Simon, M. Le diagnostic chimique de la fumure minérale à appliquer à la betterave sucrière. [**The chemical analysis (of plant and soil) in the mineral manuring to be applied to sugar-beet.**] *Publ. tech. Inst. belge Amélior. Better.* 1956, **24**, No. 1, 33–49, bibl. in text, English summary.

605 Moens, A. Nieuwe werkmethoden in de suikerbietenoogst. [**New working methods in sugar-beet harvesting.**] *Publ. 31 Inst. Landb. Rationalisatie, Wageningen* 1955, pp. 80, illus., English summary.

606 Jähnl, G. Ergebnisse der Rübenversuche des Jahres 1955. **Results of beet trials in 1955.** *VersErgebn. Bundesanst. alp. Landw., Gumpenstein* 1956, No. 33, pp. 89, illus. [Bundersanst. alp. Landw., Gumpenstein, Austria]

Of the fodder-beets, Kirsches Koloss produced the highest root yields in the trials at Gumpenstein and Lienz, and Eckendorfer Gelb in trials at Imst and Piber. Except for the trial in Piber, these varieties were significantly better than Zentaur, the standard for comparison. In the sugar-beet trials at 5 centres, Buszczynski CLR was used as the standard variety. Sugar yields

significantly higher than in the standard variety were obtained from : Kleinwanzleben polybeta at 4 centres, Beta 1 poly and Kuhn Naarden P at 3 centres, and Beta 242/53 at 1 centre. In trials with swedes, root yields significantly higher than the standard (Bangholm) were obtained from Hoffmanns W. Riesen and Weisse Schmalz (both at Piber) but no varieties were significantly better than the standard in dry-matter content.—D.B.

FODDER-BEET

607† Donà dalle Rose, A. Orientamenti sulla coltivazione delle barbabietole foraggere. [**A guide to the growing of fodder-beet.**] *Ann. Sper. agr.* 1956, **10**, No. 2, 403–13, bibl. 6, illus., English summary. [Sta. Sper. Bieticolt., Rovigo, Italy]

Results from trials indicated that fodder sugar-beet and sugar-beet for fodder are more suitable for cultivation in Italy, with regard to dry-matter yield, than the common fodder-beet.—E.B.O.

608† Bertè, M. and others. La sperimentazione irrigua eseguita a Foggia nel quadriennio 1950–1953. [**Irrigation trials at Foggia (Italy) in 1950-3.**] *Suppl. Ann. Sper. agr.* 1956, **10**, No. 4, 137–78, illus., English summary.

The trials described, carried out on a silt-clay soil in a warm-arid climate, are concerned with methods of irrigating, and amounts of irrigation water suitable for, fodder-beet var. Mammoth, grain-maize hybrid U.32 and fodder-maize hybrid Ohio M.15 Sis.—E.B.O.

SWEDE-TURNIPS

609 Fry, P. R. and Jacks, H. **Effect of foliar and soil applications of insecticides on control of aphids and turnip-mosaic virus on swedes.** *N.Z. J. Sci. Technol. A.* 1956, **38**, No. 2, 120–3, bibl. 1. [Pla. Dis. Div., DSIR, Auckland]

In a glasshouse trial, lindane and parathion controlled *Myzus persicae* on swedes (*Brassica napobrassica*) 2 days after application but not after 7 days. In the field, spray applications of lindane, parathion, schradan, TEPP and soil treatments with schradan significantly reduced the aphid populations. All materials reduced virus incidence. Parathion (0·024%), applied at 7-day intervals, was best ; compared with the control, the number of aphids per plant was reduced from 955 to 11, the % virus incidence from 80 to 35 and the yield per plant was raised from 0·69 lb. to 1·04 lb.—J.F.C.

610 Palser, Barbara F. and McIlrath, W. J. **Responses of tomato, turnip, and cotton to variations in boron nutrition. 2. Anatomical responses.** *Bot. Gaz.* 1956, **118**, No. 1, 53–71, bibl. 23, illus. [Dep. Bot., Univ. Chicago]

Lack of B in the nutrient medium resulted in a characteristic response by the petioles, leaf blades and roots of the turnip. Hypertrophy, necrosis and hyperplasia in the cambium extended to the phloem. In cotton, these responses were found in peri-medullary pith-parenchyma and in proto-xylem-parenchyma. All plants treated with B were anatomically normal.—J.F.C.

POTATOES

611 Niederhauser, J. S. and Cervantes, J. La papa como cultivo de temporal en los Valles Altos de México. [**Potatoes grown in the rainy season in the high valleys of Mexico.**] *Foll. Divulg. 20 Sec. Agric. Ganad., Mex.* 1956, pp. 43, illus.

612 Schwarz, W. Bericht über die Ergebnisse der Behandlungsversuche mit Kartoffel-pflanzgut und Zuckerrübensaatgut und über Gründüngungsversuche zu Kartoffeln im Jahre 1954. [**Report on results of experiments on the treatment of seed potatoes and sugar-beet seed and on green-manure trials with potatoes in 1954.**] *Z. landw. Versuchs- u. Untersuchwes.* 1955, **1**, No. 5, 391–5.

In 18 trials, pre-germinated, and ripe-for-sprouting seed potatoes, whether early, medium-early or late, produced significantly higher yields, viz. 13% and 6%, respectively, than untreated potatoes planted straight from storage. The following percentage increases in potato yields compared with controls were obtained by green manuring with the following legumes : yellow sweet lupin sown at 200 kg./ha., 17% ; serradella sown at 50 kg./ha., 21% ; winter vetch sown at 100 kg./ha., 27%.—D.B.

613 Robins, J. S. and Domingo, C. E. **Potato yield and tuber shape as affected by severe soil moisture deficits and plant spacing.** *Agron. J.* 1956, **48**, No. 11, 488–92, bibl. 8, illus. [Irrig. Exp. Sta., Prosser, Washington]

Soil-moisture deficits reduced total- and U.S. No. 1 grade-yields from 6–30% and from 17–58%, respectively, and produced spindled and cracked tubers. Spindling was associated with early- or mid-season soil-moisture stress treatments, the location of the constriction on the tuber corresponding to the stage of development when stress

was imposed. Reduced number of stems per hill reduced yield and the number of tubers per hill. —G.M.W.

614 Cullen, J. C. **First early potato variety trials 1950-55.** *J. nat. Inst. agric. Bot.* 1956, **7**, No. 3, 565–91, bibl. 1, illus.

The results of 137 trials during 1950–5 with 12 first-early potato varieties are considered in detail. Field characters and reaction to disease are described. The results are given as yields at mid first-early season for the centres, and as relative earliness in days at yields of 4, 8 and 12 tons/ac. for Arran Pilot. The effect of using 'once-grown' local seed as compared with fresh seed from a seed-producing district is examined. Rate-of-bulking trials are shown to give more information about the earliness of varieties than the trials lifted on one occasion only.—From author's summary.

615 Ministry of Agriculture Northern Ireland. **Reports from the counties. Potato variety trials.** *Mon. Rep. Minist. Agric. N. Ire.* 1956, **31**, No. 5, 142–4.

Of the 4 first-early varieties on trial in 1955, Arran Pilot gave the highest yield of ware, seed and chats; of the 2 second-earlies, Ulster Ensign again outyielded Ulster Emblem. Stormont Dawn was the top-yielding main-crop variety and gave the highest yield of ware and diseased potatoes. Dr. McIntosh, on trial for the first time in 1955, had a total yield nearly equal to that of Ulster Supreme, the poorest variety, but it had the highest yield of seed and chats and the lowest of ware and diseased potatoes.—M.P.

616 Höppner, E. and Geidel, H. Das Sortiment der Vorkeimsorten. [**Varieties for chitting.**] *Kartoffelbau* 1956, **7**, No. 9, 176–7. [Bundessortenamt, Rethmar, W. Germany]

The very early potato varieties Sirtema, Saskia, Vera, Oberarnb. Frühe, Comtessa, Doré, Frühmölle, Erstling and Terena are assessed, in this paper, for the following measurable qualities: gross yield, % marketable ware potatoes, dz./ha. of marketable ware potatoes, % tubers longer than 6 cm., and resistance to rot of tops and tubers.—D.B.

617 Baribeau, B. Le choix des variétés de pommes de terre. [**The choice of potato varieties.**] *Agriculture, Montréal*, 1956, **13**, No. 5, 150–3, illus.

Advice is given to growers in Canada on the choice of potato varieties in relation to particular soil types, specific commercial requirements, disease- and insect-resistance, appearance and culinary value.—M.P.

618 Haynes, F. L. and others. **Boone, a new variety of potato resistant to late blight and adapted to Western North Carolina.** *Amer. Potato J.* 1956, **33**, No. 11, 315–8.

Boone (USDA. B 880–4) is a late-maturing, high-yielding variety. The tubers are medium oblong, very smooth and shallow-eyed. They do not sprout in storage until late in the spring. Boone is highly resistant to, if not immune from, the common race of late-blight fungus [*Phytophthora infestans*].—Authors' summary.

619 Sheehan, J. E. and Odland, T. E. **A quarter century of potato variety trials in Rhode Island.** *Amer. Potato J.* 1956, **33**, No. 5, 161–5, bibl. 2. [R.I. Agric. Exp. Sta., Kingston]

From 1930–54, Green Mountain and Chippewa varieties averaged 373 and 369 bu. per acre, respectively, and the present leading varieties, Katahdin and Irish Cobbler, averaged 310 and 292 bu. per acre, respectively. Saco variety is the most promising of the newer varieties tested.—G.M.W.

620 Madec, P. and Perenneg, P. Influence de l' "origine" sur le comportement des plants de pomme de terre. [**Influence of origin on the behaviour of seed potatoes.**] *Ann. Inst. nat. Rech. agron., Paris Ser. B. Ann. Amélior. Pl.* 1956, **6**, No. 1, 5–26, bibl. 5, English, Russian and German summaries.

It has been noted in France, especially in the northern regions and with the variety Bintje, that potato plants from seed of different origin, grown under the same conditions, show differences in emergence, vigour and yield. A series of trials was carried out in 1950–5 to investigate the causes of this different behaviour, using 10 samples of Bintje of different origin, introduced in 1949–50. Results showed that there were marked differences among the samples in the first year of cultivation but that these gradually disappeared in the following years. Among the causes which are thought to determine these differences are: presence of virus S, planting date of the potatoes which yielded the tubers under trial, and storage conditions of the tubers.—E.B.O.

621 Birkner, E. Zur mechanischen Keimanregung der Kartoffeln für die Augenstecklingsprüfung. [**Mechanical stimulation of germination of potatoes for the potato-eye test.**] *Z. landw. Versuchs- u. Untersuchwes.* 1955, **1**, No. 3, 245–54, bibl. 5, illus. [Inst. landw. Versuchs- u. Untersuchwes., Jena, E. Germany]

The development in peat of young plants from

sections of chitted potatoes provides a valuable test, additional to field inspection, for certification of the highest grade of seed potato. Irregular (in time) development of the young plants is a drawback which can be overcome through breaking dormancy by mechanically shaking the tubers in revolving boxes instead of by fumigation with rindite. The resulting evenness of development shortened the time required for the test. This treatment, which was tested on several varieties and which is described and illustrated, was superior to 3 other treatments : (a) shaking and fumigation with rindite, (b) shaking only, (c) fumigation with rindite only.—D.B.

622 Gleason, L. S. and others. **Pre-emergence weed control in potatoes in Mexico's high mountain valleys.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 47–8. [Rockefeller Foundation, Mexico City, Mexico]

The following herbicides were applied pre-emergence to potatoes for the control of weeds, mainly *Sicyos angulatus*, in this region where high rainfall makes cultivation difficult or impossible : dinoseb at 4–16 lb. per acre, 2,4-D (ester) at 1–8 lb. per acre, 2,4-D (amine) at 1–8 lb. per acre, endothal at 1–8 lb. per acre, CIPC at 2–12 lb. per acre, and CMU at 0·1–4 lb. per acre. The best potato yields and weed control were obtained from the dinoseb treatments. The following year 2,4-D, dinoseb, endothal and CIPC were applied in various combinations as a band treatment over the row, cultivated once by tractor and hilled once. All treatments gave sufficient weed control. However, the 2,4-D/CIPC mixtures caused a reduction in potato yield. The cost of chemical treatment with dinoseb + cultivation was calculated at $1·47 per acre while conventional cultivation systems averaged $5·38 per acre.—*Weed Abstr.* 5 : 928.

623 Hofmaster, R. N. **Flea beetle control on Irish potatoes in Eastern Virginia.** *J. econ. Ent.* 1956, **49**, No. 4, 530–3, bibl. 4, illus. [Virginia Truck Exp. Sta., Norfolk]

The potato flea-beetle (*Epitrix cucumeris*) has shown local evidence of increasing resistance to DDT, but can still be adequately controlled therewith when a rigid spray or dust schedule is followed. Soil treatments of aldrin or heptachlor alone at 2·5 lb. actual per ac. gave a 94·2% reduction in foliage injury and practically eliminated tuber damage. The beneficial effects of soil treatments were indicated by the yields of 169 and 181 bags (100 lb.) of U.S. No. 1 potatoes per ac. for aldrin and heptachlor, respectively, as compared with 96 bags per ac. from the control.—From author's summary.

624 Pfeffer, C. Untersuchungen über den Wert der in verschiedenen Gebieten erzeugten Pflanzkartoffeln. [**Examination of the value of seed potatoes produced in different regions (of Eastern Germany).**] *Züchter* 1956, **26**, No. 9, 257–69, bibl. 71, illus., 2 maps. [Inst. Pflanzenzüchtung Gross-Lüsewitz, E. Germany]

The paper is largely concerned with the distribution of the incidence of virus disease and its influence on the source value of seed potatoes.—D.B.

625 Wenzl, H. Schalennekrosen als Kälteschäden an Kartoffelknollen. [**Skin necrosis as frost damage in potato tubers.**] *Pflanzenschutzberichte* 1956, **17**, No. 7, 97–111, bibl. 11, illus. [Bundesanst. Pflschutz, Wien, Austria]

Potato tubers stored during the very cold winter of 1956 suffered internal injury, especially of the vascular bundles, and externally a skin necrosis. [See *Fld Crop Abstr.* 8 : 563.]—D.B.

626 Wolcott, A. R. **Varietal response to climate and culture as related to the development of internal browning in potato tubers.** *Diss. Abstr.* 1956, **16**, No. 5, 844–5. [Purdue Univ., Lafayette, Ind.]

Twenty potato varieties and seedling lines were planted, using different cultural practices, on muck soils in northern Indiana. Internal browning was found to develop under conditions known to give rise to resorption of stored materials from the tubers. Periods of rising temperature in August were associated with resurgent terminal haulm growth, resorption of smaller tubers and initiation of necrotic symptoms in larger tubers. Alternating periods of high temperature during the short days of September were conducive to severe internal browning. Late planting, optimum moisture and excessive N promoted extension of growth into this particularly damaging period. The different types of necrosis were found together in the same plots of most varieties and the results indicated strongly that the types are related in origin but vary according to the physiological age of the tuber tissues at the time of injury.—From abstract.

627 Chapman, H. W. **Continuous growth of excised potato root tips.** *Amer. J. Bot.* 1956, **43**, No. 7, 468–71, bibl. 10, illus. [Univ. Nebraska, Lincoln]

628 Steineck, O. Tageslänge und Knollenbildung bei Kultursorten der Kartoffel. [**Day-length and tuber formation in cultivated potato varieties.**] *Z. PflZücht.*

1956, **36**, No. 2, 197–213, bibl. 19, illus. [Hochsch. Bodenkultur, Wien, Austria]

The varieties Flava, Jakobi, Mittelfrühe, Falke, Panther and Ultimus were grown in the field under various day-lengths. Long-day inhibited tuber formation and the stolons ("wild stolons") emerged above-ground. When day-length was reduced to 12 or 14 hr. normal stolons developed. Judged by its tuber formation, the potato is a short-day plant. The geographic distribution of the potato is discussed.—D.B.

629 MULDER, E. G. **Effect of the mineral nutrition of potato plants on the biochemistry and the physiology of the tubers.** *Neth. J. agric. Sci.* 1956, **4**, No. 4, 333–56, bibl. 10, illus. [Agric. Exp. Sta. and Inst. Soil Res., T.N.O., Groningen]

The effects of N, P and K nutrition on the amino-acid composition of tubers was studied. The composition of the soluble non-protein N was much affected by the mineral nutrition, whereas the protein composition remained fixed. Stem-end blackening of tubers and bluish-green coloration after boiling were found to be due to inadequate K-supply, which was correlated with a high tyrosine content, susceptibility to injury and increased respiration rate. Change in concentration of N, P, Mg or Cu had much less effect on this rate. Bruising stimulated the respiration of healthy cells. —J.F.C.

630 QUINN, E. and WALSH, T. **The effect of continued nutrient deficiency on the growth and vigour of the potato.** *J. Dep. Agric. Republ. Ire.* 1955–6, **52**, 3–9.

Growing the potato variety Kerr's Pink for 5 or 7 years under a severe deficiency of N or P or K had no harmful effect on the subsequent vigour and yield of the tubers when they were grown under adequate nutrition.—M.P.

631 BREEMHAAR, D. De betekenis van het werkelilke en het relatieve kaligehalte in het aardappelloof voor de knolopbrengsten. [**The significance for tuber yield of the real and relative potash content in potato leaves.**] *Landbouwk. Tijdschr. Wageningen* 1956, **68**, No. 8, 697–701, bibl. 4, illus., English summary.

On river-clay soils of varying ability to fix potash, the relationship between yields of potatoes and the content of K_2O in the leaves expressed as (a) a percentage of the dry matter and (b) as a proportion of the CaO- or MgO-content was studied. There was no constant relationship on all soils between K_2O content in the leaf and the yield of tubers. On fields with a marked K-fixing capacity, yield fell below normal when the K_2O content in the leaf fell below 2·5–3% ; on soils of slight to moderate K-fixing capacity yield fell below normal when the K_2O content was less than 4%. There was a correlation between the K_2O : CaO ratio in the leaves and yield of tubers. In general, when the K_2O content was higher than the CaO content, yield was normal. The correlation of the K_2O : MgO ratio with yield of tubers was less close than in the case of the K_2O :CaO ratio, but a proportionately low K_2O content was again associated with low yields. The yield of tubers was correlated with the K_2O : (K_2O + CaO + MgO) ratio. A normal yield was obtained when $\frac{\text{m.e. } K_2O}{\text{m.e. } (K_2O + CaO + MgO)} \times 100$ in the leaves equalled or exceeded 25 – 30%.—W.J.B.

632 BURTON, W. G. **Some observations on the growth substances in ether extracts of the potato tuber.** *Physiol. Plant.* 1956, **9**, No. 4, 567–87, bibl. 34, illus. [Ditton Lab., D.S.I.R., Maidstone, England]

Although substances which inhibited and promoted *Avena*-coleoptile elongation were present in ether extracts of potato peel, no obligatory relationship was found between the presence or concentration of these substances and the onset of sprouting. It is considered to be neither sufficient nor necessarily relevant to show that a substance inhibits the growth of *Avena* coleoptiles, without it also being shown to inhibit the growth of potato sprouts themselves.—From author's summary.

633 SCHREVEN, D. A. van. **On the physiology of tuber formation in potatoes. 4. Influence of vitamin C on tuber and sprout formation of potatoes aseptically grown in the dark.** *Plant and Soil* 1956, **8**, No. 2, 87–94, bibl. 18, illus. [Microbiol. Lab., Zuiderzee Recl. Works, Kampen, Neth.]

In experiments with tubers of the variety Duke of York, which had not formed sprouts during storage, the number of daughter tubers was increased in cultures containing vitamin C at 25–50 mg. per 250 cc. The yields and numbers of daughter tubers were markedly reduced by 100–200 mg. per 250 cc. and tuber formation was delayed. In cultures with desprouted tubers, the formation of daughter tubers was much less delayed and the number of young tubers was slightly increased by greater concentrations, more especially the 200 mg. rate. The yield of tubers was substantially increased by the 25 mg. rate.—From author's summary.

634 SCHREVEN, D. A. van. **On the physiology of tuber formation in potatoes. 5. Influence of vitamin B_1 on tuber and**

sprout formation of potatoes aseptically grown in the dark. *Plant and Soil* 1956, **8**, No. 2, 95–104, bibl. 23, illus. [Microbiol Lab., Zuiderzee Recl. Works, Kampen, Neth.]

In cultures with tubers of the variety Duke of York which had not formed sprouts during storage, the number of daughter tubers was increased by 55 μg. of vitamin B_1 and the weight of daughter tubers by 19 μg. The formation of daughter tubers was delayed for some weeks by 75 μg. of vitamin B_1. In cultures with desprouted tubers, the number of daughter tubers was substantially increased by 49 and 180 μg., but it was greatly reduced by large amounts. The results are discussed in regard to the problem of premature tuber formation.—From author's summary.

635 Eichinger, A. Über die Bildung der Reservestärke in den Knollen der Kartoffelpflanze. [**The formation of reserve starch in the potato tuber.**] *Z. Acker- u. Pflbau* 1956, **102**, No. 1, 51–68, bibl. 10. [Bayreuth, W. Germany]

This is a discussion of processes of starch formation other than the traditional one of conversion and night translocation of carbohydrates. The detail of the discussion is limited to the part played by amino acids which are easily detected when combined with $MgSO_4$. A knowledge of the biochemical processes involved in the formation of starch is not only of theoretical interest but of practical significance in manuring.—D.B.

636 Prummel, J. Kalibemesting bij aardappelen. [**Manuring of potatoes with potassium.**] *Stikstof* 1956, No. 11, 367–72, illus. [Agric. Exp. Sta., Groningen]

As a result of 2 years' comparative trials with different forms of potassium it was found that, on heavy soil, all forms of K are of approximately equal value. Potatoes are, however, sensitive to chloride, and when grown in peat and sandy soils K should, as far as possible, be applied in chloride-free forms.—G.M.R.

637 Windmill (The). **Quality potatoes require expert storage in buildings specially constructed for the purpose.** *Windmill* 1956, No. 20, 17–19, illus.

The Netherlands Institute of Potato Storage has established that potatoes do not germinate at a temperature of 4°C. or lower, and the most desirable storage temperature therefore lies between 2°C. and 4°C. The most economical way of obtaining this is by means of so-called outside air cooling, whereby potatoes are stored in a building and are exposed during the cold periods of each 24-hr. day (mostly at night) to cold air blown through them by means of a fan and an air-distribution system connected therewith. By this method considerably lower temperatures can be obtained than those which occur in pits or clamps. —G.M.R.

638 Ophuis, B. G. and Hofstra, D. Gewichtsverliezen bij de bewaring van pootaardappelen in luchtgekoelde bewaarplaatsen. [**Loss of weight in potatoes stored in air-cooled storage rooms.**] *Meded. N.A.K.* 1956, **13**, No. 5, 48–50. [Inst. Potato Storage, Wageningen]

Thanks to air-cooling technique, sprouting and mould have been practically eliminated from stored potatoes. The present work discusses losses due to respiration and evaporation in the stored material. It is inadvisable to ventilate potatoes, whether lifted green or when the foliage has dried, during the first 14 days of storage.—G.M.R.

639 Mikaelsen, K. and Roer, L. **Improved storage ability of potatoes exposed to gamma radiation.** *Acta agric. scand.* 1956, **6**, No. 2, 145–54, bibl. 10, illus. [Agric. Coll. Norway, Vollebekk]

Potato tubers were irradiated with gamma-radiation doses of 5000–20,000 röntgen and stored for 1 year in the dark at 4–6°C. Another sample was treated with the growth-inhibitor Fusarex. Sprouting and shrinkage were completely inhibited by 10,000–20,000 r. ; tubers treated with 5000 r. showed negligible sprouting, while Fusarex-treated and untreated tubers, especially, showed considerable sprouting. All irradiated tubers showed a much lower loss in fresh and dry weight as compared with Fusarex-treated and untreated potatoes. Tubers irradiated with 5000–10,000 r. were quite acceptable as food after 1 year, while untreated and Fusarex-treated potatoes were not. —From authors' summary.

640 Habib, A. T. **Physical and chemical factors influencing the color of potato chips.** *Diss. Abstr.* 1956, **16**, No. 5, 841. [Ohio State Univ.]

Varieties having relatively high amounts of free, and especially basic, amino acids produce dark chips. Storage at 75°F. for 3 weeks caused a suitable decrease in free amino compounds. Katahdin tubers grown at a high N-level produced chips of better colour.—From abstract.

SWEET-POTATOES

641 Moscoso, C. G. El cultivo de la batata en Puerto Rico. [**Sweet-potato growing in Puerto Rico.**] *Bol. 126 Puerto Rico Esta. exp. agric.* 1955, pp. 73, illus., English summary. [Received Aug., 1956]

The information given includes methods of propagation, varieties and storage. The best varieties are Rico, Canela and U.P.R. 3.—E.B.O.

642 SASTRY, K. S. K. **Sweet potato varieties and cultivation [in Mysore, India].** *Mysore agric. calendar and yrbk* 1955. 1956, 77–80, illus.

Three high-yielding types of sweet potato [*Ipomoea batatas*] Hosur green, Hosur red and Raja have been released for distribution. In field trials these yielded 30% more than the control. A number of varieties set seed in Bangalore and it was found that excellent germination was obtained by placing the seeds in shallow trays, pouring boiling water over them and then allowing them to cool and soak for an hour. From a study of numerous seedlings, cordate, entire leaves were usually found to be correlated with good tuber formation and completely green leaves with straw-yellow tubers.—J.F.C.

643 FRONK, W. D. and PETERSON, L. E. **Wireworm control in Iowa sweet potato fields.** *J. econ. Ent.* 1956, **49,** No. 4, 479–81, bibl. 1. [Iowa Agric. Exp. Sta., Ames]

Sweet-potatoes [*Ipomoea batatas*] grown in the Muscatine Island area of Iowa are often severely injured by wireworms (*Melanotus* spp.). Insecticides applied in the transplant water gave better control than when applied to the rows in a fertilizer mixture. Aldrin at 0·125 lb./ac. gave satisfactory control without the suppression of yield it caused at higher doses. Soil fumigants gave no practical control.—From authors' summary.

644 KASAI, Z. and others. **Translocation of mineral nutrients in higher plants. 6. The correlation between distribution of mineral nutrients absorbed and phyllotaxis in sweet potato (*Ipomoea batatas* Lam.).** [Japanese] *J. Sci. Soil, Japan* 1956, **27,** No. 2, 83–5, illus., English summary. [Kyoto Univ.]

645 HOWELL, M. J. **Physiological studies of the sweetpotato (*Ipomoea batatas*). Phase I: Effects of chemical treatments on sprout production. Phase II: Chemical induction of flowering.** *Diss. Abstr.* 1956, **16,** No. 6, 1034–5. [Michigan State Univ.]

MH–30 and B–214 (α-cyano-β-(2,4-dichlorophenyl) acrylic acid) at 10–1000 ppm. and 2,4-D at 10 ppm. were injected into the roots of the varieties Porto Rico, Goldrush, Yellow Jersey and Orange Jersey. B–214 at 1000 ppm. reduced the sprout weights of Porto Rico and Goldrush. Foliar application of 2,4-D at 100 and 500 ppm. during the initial enlargement of the fleshy roots successfully induced flowering in Porto Rico, Goldrush (after 6–8 weeks) and Yellow Jersey. Flowering was general and associated with a depression of storage-root growth. For Porto Rico, 500 ppm., and for Yellow Jersey, 100 ppm., were best.—From abstract.

CASSAVA AND YAMS

646 PACHECO, J. A. C. Alterações do teor de amido durante o armazenamento das raízes de mandioca. [**Changes in starch content during the storage of cassava roots.**] *Bragantia* 1954, **13,** Note 6, 15–16, bibl. 2, English summary. [Received July, 1956]

In trials in Brazil, the starch content of fresh cassava (*Manihot utilissima*) roots and that of roots stored for 24, 48 and 72 hr. under field conditions was determined by Ewers' method. In the majority of cases the starch content did not change, probably owing to the relatively low air temperatures that prevailed during the trials. Since, however, losses in root weight occurred (2, 5 and 7% for the periods of 24, 48 and 72 hr., respectively) and starch quality decreased, it is not considered advisable to store cassava roots for periods longer than 24 hr.—E.B.O.

647 KENNARD, W. C. and MORRIS, M. P. **Influence of cultural practices on tuber yields and sapogenin content of *Dioscorea floribunda*.** *Agron. J.* 1956, **48,** No. 11, 485–7, bibl. 6, illus. [Fed. Exp. Sta., Mayaguez, Puerto Rico]

Diosgenin, a sapogenin obtained from tubers of *Dioscorea floribunda*, can be converted into compounds such as cortisone and progesterone. Plants of a high-sapogenin-yielding tropical variety (PI 201783) when grown for 2 yr. gave an average increase in tuber yield of 360% over plants harvested after 1 year's growth. Adequate vine support greatly increased both tuber yield and the percentage of crude sapogenins in the tubers. Plants correctly spaced (5 ft. × 2 ft.), grown with trellis support, and harvested after 2 yr. gave calculated yields of crude sapogenin of 226 lb./acre.—D.B.

COCOYAMS

648 MOURSI, M. A. **A note on the relationship of gaps in stand and yield of dasheen.** *Emp. J. exp. Agric.* 1956, **24,** No. 95, 245–6. [Ain Shams Univ., Cairo]

An experiment is described in which it was shown that, for a 12% reduction in plant stand in plots of

Colocasia esculenta, the larger the gap in the rows the greater was the reduction in yield.—M.P.

649 Barrau, J. Plantes alimentaires de base des Mélanésiens. [**Basic food plants of the Melanesians.**] *J. Agric. trop. et Bot. appl.* 1956, **3**, No. 1–2, 32–49, bibl. in text, illus.

Among the starch plants studied were *Colocasia antiquorum, C. esculenta, Xanthosoma sagittifolium, X. violaceum, X. atrovirens, Dioscorea alata, D. esculenta, Manihot esculenta, M. dulcis* and *Ipomoea batatas*.—E.B.O.

FIBRE CROPS

COTTON

650 Gadkari, P. D. **Cotton growing in United States of America and its bearing on cotton production in India.** *Indian Cott. Gr. Rev.* 1956, **10**, No. 4, 203–13. [Inst. Pl. Industr., Indore]

651 Deo, K. G. **Effect of locality, sowing dates and manure on fibre properties of cotton—a short note.** *Indian Cott. Gr. Rev.* 1956, **10**, No. 3, 177–83, bibl. 11. [Cott. Res. Lab., Dharwar, Bombay]

The varieties Laxmi (*Gossypium hirsutum*) and Jayadhar (*G. herbaceum*) were sown under 4 N-treatments at Dharwar on 24 July, 7 and 21 August, and at Gadag on 15 and 28 September, 1953. At Dharwar, the third sowing date was superior to the first as regards mean fibre length, Laxmi had a lower fibre weight than Jayadhar and N application lowered the fibre weight. At Gadag, Laxmi had a higher fibre length and was finer than Jayadhar.—From author's summary.

652 Negi, L. S. and Singh, A. **Improved strains of Punjab American cotton. 1. 216F.** *Indian Cott. Gr. Rev.* 1956, **10**, No. 4, 225–31, bibl. 4, illus. [Dep. Agric., Punjab]

Results of trials carried out from 1942–52 are given, in which, on average, the cotton strain 216 F yielded 1·53 maunds [1 maund = 82·3 lb.] of seed-cotton/ac. more than M60A2. It is earlier-maturing, drought resistant, possesses fair resistance to jassid and has superior fibre properties.—M.P.

653 Rea, H. E. **Controlling established Johnson grass in cotton and other row crops.** *Proc. 9th S. Weed Contr. Conf.* 1956, 15–18. [Texas Agric. Exp. Sta., College Station]

Johnson grass [*Sorghum halepense*] may be controlled by crown treatments with 1 : 1 mixture of naphtha and diesel oil ; by foliage application of dalapon 15 lb./ac. + wetter 2% applied twice ; MH or dalapon at lower rates followed by crown treatments ; 15 lb. dalapon + 30 lb. TCA + 2% wetter/ac. followed by spot treatment. Cotton can be planted 1–4 days after the dalapon treatment.—*Weed Abstr.* 5 : 1018.

654 Foy, C. L. and Miller, J. H. **Weed control in California cotton.** *Proc. 8th Calif. and 15th W. Weed Contr. Conf.* 1956, 100–4. [Univ. Calif., Davis]

A review is given of various cultural methods for the control of water grass [*Echinochloa crus-galli*] in cotton together with their cost and effect.—From *Weed Abstr.* 5 : 1403.

655 Albert, W. B. and others. **Weed control and cotton plant tolerance to various pre-emergence herbicides.** *Proc. 9th S. Weed Contr. Conf.* 1956, 10–14.

The only compounds to give satisfactory weed control at rates non-injurious to cotton were CIPC, 2-chloro-4, 6-bis (diethylamino)-S-triazine, 3,4-DDU and 2 chloroethyl-N-(3-chlorophenyl) carbamate. The main weeds were *Amaranthus* spp. and crabgrass (*Digitaria* spp).—From *Weed Abstr.* 5 : 1017.

656 Bingham, W. and others. **A study of the influence of nutrient level (N, P, K) and pH on the response of cotton (*Gossypium hirsutum* L.) and Italian ryegrass (*Lolium multiflorum* Lam.) to 3(3,4-dichlorophenyl)-1,1-dimethylurea.** (Abstract) *Proc. 9th S. Weed Contr. Conf.* 1956, 153. [North Carolina State Coll., Raleigh]

A deficiency of P increased the effect of 3,4-DDU on cotton. The effect of the herbicide was least at the optimum pH for plant growth. There was no apparent relationship between K and N concentration and response to 3,4-DDU.—*Weed Abstr.* 5 : 1046.

657 Revilla, V. A. and others. Control de la chupadera del algodonero mediante fungicidas. [**Control of cotton rot (*Rhizoctonia solani*) by fungicides.**] *Bol. trim. Exp. agropec., Lima* 1955, **4**, No. 2, 19–24. [Esta. Exp. Agríc. La Molina, Peru]

The best control (2·3% of dead plants) was achieved by dry treatment of the seed with Mathieson 275 (based on 75% pentachloronitrobenzene) applied at the rate of 345 g. per 100 kg. of seed (the highest rate tested). This result was statistically significant.—E.B.O.

658 Barbosa, A. J. da S. *Empoasca facialis* Jacobi, o jasside do algodoeiro : sua biologia e métodos de combate. [*E.*

facialis, **cotton jassid : its biology and methods of control.**] *Mem. Trab. 15 Cent. Invest. cient. algod. Lourenço Marques* 1954, pp. 28, bibl. 14, illus., English summary. [Received June, 1956]

659 Reynolds, H. T. and Deal, A. S. **Control of the southern garden leafhopper, a new pest of cotton in southern California.** *J. econ. Ent.* 1956, **49,** No. 3, 356–8, bibl. 9. [Univ. Calif. Citrus Exp. Sta., Riverside (H.T.R.) ; and Univ. Calif. AES, El Centro (A.S.D.)]

Of the chlorinated hydro-carbon insecticides tested for control of *Empoasca solana,* perthane gave the most promising results. Of the phosphate insecticides, demeton, parathion, and diazinon gave excellent results.—From authors' summary.

660 Barbosa, A. J. da S. A " lagarta vermelha" (*Diparopsis castanea* Hmps.) : biologia e métodos de combate. [**Red bollworm (*Diparopsis castanea*) : biology and methods of control.**] *Mem. Trab.* 19 *Cent. Invest. cient. algod. Lourenço Marques* 1954, 33–84, bibl. 22, illus., English summary. [Received June, 1956]

661 Joyce, R. J. V. **Large-scale spraying of cotton in the Gash Delta in eastern Sudan.** *Bull. ent. Res.* 1956, **47,** No. 3, 399–413, bibl. 5.

During 1952–3, 22,300 and 6700 feddans [1 feddan = 1·038 ac.] of X1730A cotton, grown under controlled flush irrigation, were sprayed once and twice, respectively. Each spray consisted of 1 lb. technical DDT per feddan and was applied by aircraft in 2 gal. of spray per feddan. Results indicated that any benefits which the crop enjoyed, as a result of elimination of leaf-feeding insects (mainly *Empoasca lybica, Hercothrips fumipennis* and *H. sudanensis*) by DDT spray, were completely lost through increased bollworm (*Diparopsis watersi* and *Earias insulana*) attack, which reduced the yield below that of unsprayed cotton.—From author's summary.

662 Fowler, H. D. **Some physiological effects of attack by whitefly (*Bemisia gossypiperda*) and of spraying parathion on cotton in the Sudan Gezira.** *Emp. Cott. Gr. Rev.* 1956, **33,** No. 4, 288–99, bibl. 37, illus.

663 Kružilin, A. S. and Nazirov, N. N. [**Peculiarities of phasic development in some cotton varieties.**] [Russian] *Fiziol. Rast.* (*Pl. Physiol., USSR*) 1956, **3,** No. 3, 199–203, bibl. 11, illus., English summary. [Pl. Physiol. Inst., Timirjazev Acad. Sci., Moscow]

In 1954–5, early and late cotton varieties, cultivated in Central Asia, were subjected to vernalization, and then grown as pot plants in a greenhouse under different daylight treatments. Vernalization of germinating seed was carried out at 24–27°C. during 10 days ; the plants were subsequently kept at above 25°C. The 10-hr.-day treatments were carried out for 12–15 days, beginning at 0, 12, 24, and 36 days after germination ; the plants were afterwards kept under natural 17-hr.-days. There were 4 replicates of each treatment. Compared with controls, vernalized plants grew more slowly after germination, but later rapidly surpassed the controls and came into bud 2–3 days earlier. In the early variety C-3210, vernalization was completed during germination and the photophase took place under the short-day treatment in the first 15 days(1–2 leaf stage). In the late variety C-460, the vernalization phase was passed in the young green plants ; the photo-phase began only 10–12 days after germination and continued during the following 10–12 days (3–4 leaf stage).—J.F.G.

664 Dastur, R. H. and Bhatt, J. **Effect of chemical hormones on the carbohydrate and nitrogen contents of cotton plant.** *Indian J. agric. Sci.* 1956, **26,** Pt. 1, 39–79, bibl. 32, illus. [Inst. Pl. Ind., Indore]

Cotton (*Gossypium hirsutum*) was sown in plots on 20 June 1952 and sprayed on 8 August at 80 gal. per acre with pure water and at 2·5 ppm. each with TIBA (2,3,5-triiodobenzoic acid), NAA (2-naphthalene acetic acid) and IBA (2-3 indolyl butyric acid). The progressive changes in content of dry-matter, carbohydrates (chiefly starch) and N in the aerial organs were studied. At harvest (16 Dec.), the average dry weight of control plants was 20·1 g. and of hormone-treated plants 23·1–26·7 ; the dry weights of the floral organs were 12·6 and 14·7–17·6 g., respectively. The hormones did not affect the total N of stem and leaf, but the floral organs showed a higher N content at all stages and protein-N was higher throughout the plant.—J.F.G.

665 Negi, L. S. and Singh, A. **A preliminary study on the effect of some hormones on yield of cotton.** *Indian Cott. Gr. Rev.* 1956, **10,** No. 3, 153–6, bibl. 6. [Cott. Breed. Sta., Hansi, Punjab]

Preliminary experiments on cotton were conducted in 1952–3 to determine the effect of hormones on boll-shedding and yield. Solutions of planofix, containing α-naphthalene acetic acid, were sprayed at 5–40 ppm. on American 216F. The 10-ppm. rate gave the highest boll number and

yields. The fact that the boll number of the last (4th) picking alone was significantly increased, indicated that the treatment was beneficial to the flower buds present on the day of treatment and later buds, and that earlier treatment may be better. [See Abs. 664.]—J.F.G.

666 Gulati, A. N. **Synonyms of cotton.** *Indian Cott. Gr. Rev.* 1956, **10**, No. 4, 253–60, bibl. 37.

667 Institut de Recherches du Coton et des Textiles Exotiques. Activité de l'IRCT. Année 1954. [**The work of the IRCT during 1954.**] *Cot. et Fibr. trop.* 1955, **10**, No. 2, 81–256, illus.

Investigations reported on cotton :

French Equatorial Africa. Bambari Station, pp. 91–110. In small-scale trials with the newer selections, Banda 4 produced more and better quality lint than the earlier standard, Banda 2. As reported last year, Banda again out-yielded Triumph. Fertilizer trials demonstrated that dung, crushed cotton-seed and its oil-cake had little influence on cotton yields, but, whereas ammonium sulphate significantly increased yields, phosphates and potash fertilizers gave variable responses. Trials on fertilizer placement and timing are reported. DDT or toxaphene applications gave the best control of pests and the desirability of giving a late application of these was demonstrated even when earlier treatments against *Lygus*, *Helopeltis* and *Hemitarsonemus* had been employed. The importance of delinting seeds and the usefulness of fungicides was demonstrated during seed storage. Bossangoa Station, pp. 111–16. The yields of seed and lint indicated the superiority of Soumbé A25B9, Allen 150 and Allen 157 cottons. Crushed cotton-seed gave an appreciable fertilizer response, while the need for cultivators to sow earlier was demonstrated. Tikem Station, pp. 117–37. The superiority of 58–151 and 51–296–46 cottons was demonstrated in small trials with new varieties while, at out-stations, A150 and 58–151 also proved their usefulness. Kraal manure (chiefly horse) and crushed cotton-seed augmented yields. Fertilization with ammonium sulphate, both in the presence, and in the absence, of added phosphates, gave significant cotton-seed responses and both inorganic N and K significantly improved lint returns. At Youé, kraal manure (of cattle origin) and artificial N, but not P, increased yields while at Karnal, goat manure, artificial N and P all improved the yield. Population trends are reported for *Diparopsis watersi*, Jassids (*Empoasca* sp.) and *Earias* sp. and the results of insecticidal treatments are outlined. Bebedjia Station, pp. 138–49. Variety trials demonstrated the superiority of 44–10 and indicated the usefulness of A150 and of 58–151 on rich and poor soils. At substations, A150 was significantly superior to 58–151 and the latter was significantly more productive than 44–10. Ammonium sulphate, but not P, K or dung, increased yields.

French West Africa. Bouaké Station, pp. 150–67. Variety trials showed that Mono 53, Mono 54 and Ishan Nigeria compared well with the local Bouaké cotton. Encouraging responses to treatment were recorded with dieldrin. Anie-Mono Station, pp. 167–75. Comparative yields of small-scale plots were reported which indicated the possibilities of T28–150, M53, M54 and A54. M'Pesoba-Koutiala Station, pp. 175–82. A58–151 appeared likely to excel the productivity and lint quality of the previous reference standard, A50T. Applications of phosphates significantly increased yields but ammonium sulphate was ineffective unless it was accompanied by phosphate. When this occurred, yields increased with the rate of N application.

North Africa. Morocco, Tadla Station, pp. 183–214. Good rains and relative freedom from 'chergui' winds increased cotton yields. With *Gossypium barbadense*, A20 and A17 outyielded the other Ashmouni lines and M12 was superior to other Menoufi strains, although the Pima 67 × Menoufi crosses, H20 3F and H20 3G, also yielded well. In comparative trials, Ashmouni and Pima 32 proved superior in lint production to other varieties but Menoufi was the earlier maturing. Of the *G. hirsutum* varieties, Delfos and Acala Rogers yielded the most lint. Shedding of bolls is appreciably greater for *hirsutum* than for *barbadense* varieties. In a trial with the American Acala Rogers, a different result was recorded from that in previous tests with Egyptian cotton in that wider spacing was superior to close planting. In irrigation, an important saving of water can be achieved in spring but, after flowering, water applications must reach 600–650 cu. m. every 10 days. Watering must continue until September and the bolls of the first harvest have opened. The conclusion of previous years was confirmed—that it is the total P_2O_5 which influenced yields. In rotation trials, with cotton following cotton, organic manures, with or without added mixtures of N, P or K artificials, gave responses but artificials alone did not. With cotton once in 2 years, with lucerne, mineral mixtures gave responses which were even more marked as the rotations became longer and increased the opportunities for a build-up of organic matter. *Earias* sp. was controlled in American cotton by powdered cryolite, the insecticidal procedure recommended being 1 or 2 sprayings with endrin early in the season followed by cryolite powder later. For protecting young plants against *Rhizoctonia*, *Alternaria*, etc., Hg powder + lindane or TMTD + lindane gave the best results. Algeria. Penegaux Station, pp. 215–24. In pedigree selection studies, Karnak 52 showed a marked superiority. In

district trials, Dendera surpassed all other varieties while Menoufi and Ashmouni have exceeded the yields of K52. A density trial indicated that between 100,000–200,000 plants/ha. gave the best cotton yields. In the Hamadena saline soils where the NaCl content varied with season from 2·5 to 5 per thousand, considerable increases in productivity have been achieved by encouraging the early maturity of the cotton so that flowering takes place before the salt rises in quantity to the level of the roots before August. Madagascar, pp. 226–9. Preliminary efforts have been directed towards the definition of the best time for sowing and which zones are suitable for cotton. So far Acala 442, Acala California and Allen 150 have given the best returns.—M.H.F.

668 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations. Season 1954-55. Tanganyika Territory, Lake Province.** London, 1956, pp. 24, illus.

INVESTIGATIONS REPORTED :

1. Sowing-date trial, p. 4. Results obtained in previous years were confirmed. [See *Fld Crop Abstr.* 9 : 191.]

2. Land-resting trial, pp. 2–3 and 4–6. At Ukiriguru, yields were increased by the practice of crop rotation and land resting and by applications of cattle manure and the use of P and ammonium sulphate. Seed-cotton production was increased where P was added to land which had previously been cropped with millet undersown either with cowpeas or a mixture of *Crotalaria* sp. and *Tephrosia* sp., or to land previously cropped with velvet beans.

3. Manuring and fertilizers, pp. 3 and 6–9. Results similar to those recorded in previous years were obtained. There were indications of the balance needed, in farming the hill sands, between P requirement and N.

4. Ridge-tying trials, pp. 9–10. Results were similar to those in previous years.

5. Strain trials, pp. 3 and 10–14. Uk 55 was constituted and issued for multiplication on Kome Island. Uk 48 and Uk 51, in trials at Ukiriguru, Lubaga and on district plots gave increases of 75–132 lb. lint per ac. over Mz 561, while 0/344 and 1/667, the constituents of Uk 55, outyielded Uk 48 and 51.

6. Treatment of seed against *Xanthomonas malvacearum*, pp. 16–18. Treatment increased the yield of seed cotton by 20% in a rotation trial. Agrosan GN5 was more effective than Perenox and Perecot 45.—M.P.

669 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations. Season 1955-56. Kenya.** London, 1956, pp. 14.

In Nyanza Province, March sowing again appeared to be the optimum time for the highest yields of seed-cotton. There was no evidence that intercropping with maize altered the incidence of pests on cotton in any way from that on pure stands of cotton. Plots sown on tied bench ridges outyielded those sown on the flat. In variety trials in the Coast Province, Uk 48 was the best. Cotton interplanted with maize yielded less than an equivalent area of a pure stand of cotton.—M.P.

670 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations. Season 1955-56. Aden Protectorate.** London, 1956, pp. 13, illus.

Cotton varietal trial, pp. 3–4. BAR XL1 continued to give the best overall performance, though in 1955–6, BAR XL3 and Domains Sakel gave higher yields of seed-cotton and lint, and had a lower ginning out-turn. [See also *Fld Crop Abstr.* 9 : 543.] Sowing methods, p. 5. Sowing cotton by hand at a spacing of 1 m. with 3 plants per planting point gave higher seed-cotton yields than sowing in drills 1 m. apart and then thinning to 1 m. in the drill. In both methods the plant populations were approximately 12,000 per ac.—M.P.

FLAX

671 DANELL, N. Sortförsök med spånadslin åren 1951–55. [**Varietal trials of fibre flax, 1951-5.**] *Medd. 69 Stat. JordbrFörsök* 1956, 83–112, bibl. 10.

In Sweden, the flax area which is mapped, covered 3796 ha. in 1955. Sixty-four trials conducted from 1951 to 1955 tested the Svalöf varieties Herkules, Gerda, Margareta, Kristina, and SV. 0200 ; the Dutch varieties Concurrent, Formosa, Wiera, Percello, Diana, Fivel, Verum and Solido ; and the Northern Irish variety Liral Prince (in 2 trials only). On an average, marked superiority was exhibited by the variety Wiera. Of the other varieties, Kristina was distinguished by good fibre quality. The highest seed yields were obtained in the plains of Skåne, in the extreme south of Sweden. The highest total fibre yields were produced in the south of Halland and in the southern Swedish uplands.—G.M.R.

672 FRIEDERICH, J. C. Het huidige vezelvlasrassensortiment in Nederland, gebaseerd op de resultaten uit de jaren 1954–1955. [**The present collection of fibre-flax varieties in the Netherlands, based on the results of trials in 1954 and 1955.**] *Meded. N.A.K.* 1956, **13,** No. 5, 47. [Netherlands Flax Inst.]

The variety Siera occupies 90% of the total flax area (32,196 ha.) in the Netherlands. The poor

weather conditions of 1954 showed the unsuitability of varieties with inadequate strength of straw for growing in the Netherlands, e.g. the Irish varieties, in spite of their very good flax quality. In addition to Wiera, 3 other Dutch varieties (Diana, Solido, Madonna) and one Belgian variety (Regenboog) proved promising. An account is given of their respective degrees of productivity in straw, seed, lint content and lint yield, and of their lint quality, stiffness of straw, susceptibility to disease, reliability of yield and time of ripening.—G.M.R.

673 Kommedahl, T. and others. **The prevalence and importance of damaged seed in flax.** *Tech. Bull. 215 Minnesota Agric. Exp. Sta.* 1955, pp. 40, bibl. 33, illus.

In a survey of flax seed blemishes, cracking was the most prevalent, particularly if seeds were harvested mechanically in dry weather. Split seed coats occurred more commonly in yellow- than in brown-coated seeds and the incidence varied both between varieties and seasons. Blighted seed, which varied with season and locality, was probably associated with wet conditions during harvest and storage. Location rather than variety determined fungal attack but big differences occurred between seasons. *Alternaria linicola* was the most frequently recorded fungus followed by *Colletotrichum lini*. Chemical treatment of damaged seeds improved germination, subsequent growth and seed production. No correlation existed between cracked seed % and seed size, oil content or iodine number but both split and blighted seed % were significantly correlated with seed size and oil content. Whereas blighted seed % was negatively correlated with iodine number this was not related to split seed %. —M.H.F.

674 Helgeson, E. A. **Phyto-toxic materials in several perennial weeds.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 6–7. [North Dakota Agric. Exp. Sta., Fargo]

Extracts of stems and leaves of *Cirsium arvense*, *Convolvulus arvensis*, *Euphorbia esula* and *Rumex mexicanus* which had been previously sprayed with 2,4-D and harvested 3, 5 and 10 days later, were applied to flax seeds in Petri dishes. Material from unsprayed plants had little or no effect on germination, while all extracts from sprayed plants decreased germination. In general, *Cirsium arvense* extracts were most toxic followed by *Convolvulus arvensis*, *Rumex mexicanus* and *Euphorbia esula*.—*Weed Abstr.* 5 : 892.

675 Wieringa, K. T. **The micro-organisms decomposing pectic substances in the dew retting process of flax.** *Neth. J. agric. Sci.* 1956, **4**, No. 2, 204–9, bibl. 7. [Agric. Univ., Wageningen]

676 Frederiksen, P. S. Beretning om Dansk Hørforskningsinstituts arbejde i 1955. **Report on the work of the Danish Flax Research Institute in 1955.** *Lin.* 1956, **10**, No. 1, 1–4, bibl. 8, English summary.

HEMP

677 Yoshida, S. **Photoperiodic responses of hemp [*Cannabis sativa*] plants, especially their morphogenetic changes in leaf shape.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **24**, No. 3, 213–16, bibl. 9, illus., English summary. [Osaka Prefectural Naniwa Univ., Japan]

678 Heslop-Harrison, J. **Auxin and sexuality in *Cannabis sativa*.** *Physiol. Plant.* 1956, **9**, No. 4, 588–97, bibl. 12, illus. [Dep. Bot., Queen's Univ., Belfast, N. Ireland]

The effect of NAA on the sexuality of the dioecious *Cannabis sativa* (hemp) was investigated in plants flowering after a period of minimal photoperiodic induction. In genetically 'male' plants, female flowers were found in sites normally occupied by male flowers. This suggests that flower sexuality may be normally regulated by the level of natural auxin near the meristems during the period of differentiation of flower primordia.—From author's summary.

679 Jannaccone, A. Concimazione fosfo-potassica e competizione delle piante fra loro in *Cannabis sativa* L. [**PK-manuring and plant competition in hemp (*Cannabis sativa*).**] *Ital. agric.* 1956, **93**, No. 2, 131–5, bibl. 6, illus.

[See also *Fld Crop Abstr.* 7 : 225.]

JUTE

680 Jarman, C. G. and Kirby, R. H. **The differentiation of jute and some jute substitute fibres based on the type of crystals present in the ash.** *Colon. Pl. Anim. Prod.* 1955, **5**, No. 4, 281–7, bibl. 18, illus. + append.

Samples of ashed and macerated fresh tissue material of jute and jute substitute fibres were examined microscopically. True jute, *Corchorus capsularis* and *C. olitorius*, contained mostly solitary crystals, always in chains, and found mainly in the medullary ray cells and phloem ; cluster crystals were present occasionally, mainly in the cortex. Substitute fibres, kenaf (*Hibiscus cannabinus*), roselle (*H. sabdariffa*) and *Urena lobata* contained only cluster crystals. The abundance of crystals

appeared to be related to the degree of cleanliness of the fibre sample. It is recommended that samples, to be representative, should include nodal and cortical tissue. Other members of the Tiliaceae (to which true jute belongs) were also found to contain chains of solitary crystals, while in the Malvaceae (jute-substitute-fibre family) and Sterculiaceae, cluster crystals predominated ; solitary crystals were occasionally present, but never in chains, except in *Abutilon longicuspe*. None of these other fibres is yet produced on a commercial scale. —M.P.

681 KISHEN, K. and ASTHANA, R. S. **Estimation of yield of jute in U.P.** *Jute Bull.* 1956, **19**, No. 6, 116–19. [Dep. Agric., U.P., India]

The results of state-surveys on jute have demonstrated the feasibility of using the stratified random sampling method of conducting crop-cutting experiments for estimating the average yield of jute with statistical precision. It appears that the estimates of average yield for the State can be framed with a standard error of 3 to 4% by sampling about 130 villages, with 2 fields per village, from the jute belt in the State.—From authors' summary.

KENAF

682 MCCANN, L. P. **Kenaf (*Hibiscus cannabinus* L.). A bibliographical survey.** *Bibl. Bull. 17 US Dep. Agric.* 1952, pp. 20, bibl. 115. [Received July, 1956]

OIL CROPS

LINSEED

683 PANDEY, K. K. **Studies in autotetraploids of linseed (*Linum usitatissimum* L.). 1. Growth rate.** *Lloydia* 1956, **19**, No. 2, 120–8, bibl. 12, illus. [Div. Bot., Indian Agric. Res. Inst., New Delhi]

A comparative study of growth in 3 varieties of diploid and induced autotetraploid linseed was carried out under tropical Indian conditions and the results compared with known differences in flax diploids and tetraploids. Unlike tetraploid flax, tetraploid linseed is giant in form and grows more rapidly in height and stem thickness throughout the season than the diploid ; in Sweden its growth-rate is higher only towards the end of the season. The number of branches and rate of branching of the tetraploid linseed compared with the diploid are also relatively higher.—J.F.G.

684 HØJENDAHL, K. Løbende kontrol af klimaet både over og under jorden i en oliehørmark i Den Kgl. Veterinær- og Landbohøjskoles undervisningsmark. [**Continuous testing of climate above and below the soil in an oil-flax field at the Royal Veterinary and Agricultural College (Copenhagen).**] *Lin* 1955, **9**, No. 3, 37–43, English summary.

Monthly mean-values of temperatures at various depths in bare soil are given. The average temperature-differences between those in a bare soil and in an oil-flax field were found to be smaller than those found earlier for oats, wheat and beets. The soil moisture in the oil-flax field and in bare soil was registered by tensiometers and by determination of the water table. Curves showing the variation with time of hydraulic heads at various depths are given ; from these the rate of root growth was determined. Oat roots grew 1·6–1·0 cm. per day and penetrated about 1 m. The growth-rate of the flax roots was 0·6 cm. per day, and they were able to descend to 0·5 but not to 0·75 m. [See *Fld Crop Abstr.* 7 : 679.]—From author's summary.

685 MANNER, R. **Studies on seed-setting and seed yield in oil flax.** *Medd. Gullak. VäxtförädlAnst.* 1956, No. 12, pp. 139, bibl. 390, illus. [Otto J. Olson and Sons, AB, Hammenhög, Sweden]

Intra- and inter-plant variability in the seed setting and seed development of *Linum usitatissimum* were studied with special reference to the influence of the presence of basal branches and of certain environmental conditions. These latter were : date of sowing, seed rate, distance between rows, irrigation, and fertilizers.—D.B.

686 CRUICKSHANK, I. A. M. and SWAIN, T. **Study of phenolic compounds in oil-flax (*Linum usitatissimum*).** *J. exp. Bot.* 1956, **7**, No. 21, 410–15, bibl. 14, illus. [Sch. Agric., Cambridge]

SUNFLOWER

687† CHOUDHURI, H. C. and BANERJEE, H. T. **Sunflower as oilseeds and fodder crop in West Bengal.** *Sci. and Cult.* 1956, **21**, No. 11, 675–7, illus. [State Agric. Res. Inst., Tollygunge, Calcutta, India]

The results are given of trials with the introduced varieties Giant Russian, Sunrise inbred Advance female parent, Sunrise, and a local West Bengal strain. Average seed yields of the above varieties in the order given were 542, 209, 172 and 220 lb. per ac., compared with an average yield of 700 lb. per ac. in Western countries. Seed oil-contents ranged

from 19·9 to 21·4%, compared with 45% in Western countries, while yields of fodder were 28,232, 10,468, 9680 and 18,460 lb. per acre compared with 44,800 lb. per acre.—P.J.B.

688 Jacobson, L. and Oertli, J. J. **The relation between iron and chlorophyll contents in chlorotic sunflower leaves.** *Pl. Physiol.* 1956, **31**, No. 3, 199–204, bibl. 19. [Coll. Agric., Univ. Calif., Berkeley, California]

When iron was supplied to sunflower plants at a uniform rate, a good correlation between chlorophyll and iron contents was obtained. After a preliminary period of deficiency, subsequent adequacy of iron caused accumulation of iron in the leaves, but the chlorosis tended to be irreversible. It is suggested that iron is directly or indirectly involved in chloroplast formations via protein synthesis. [See also *Fld Crop Abstr.* 7 : 1338.]—From authors' summary.

RAPE

689 Fujii, S. **Studies on oil formation in rape-seed. (3) On the spring-seeded rape at high lands.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **25**, No. 1, 8–10, bibl. 11, illus., English summary. [Univ. Osaka Prefecture]

Rape varieties, Norin No. 12 and Norin No. 16, sown in spring at high altitudes, grew vigorously ; the pod and seed developed more rapidly than in autumn-sown rape, but the oil content was low. The low oil content and low iodine number in the initial stages of seed development were attributed to the rapid development under high, summer temperatures.—From English summary.—D.B.

690 Kasai, Z. and Okuda, A. **Translocation of mineral nutrients in higher plants. 5. Redistribution of calcium absorbed by rape and sesame plants.** [Japanese] *J. Sci. Soil, Japan* 1956, **27**, No. 1, 19–22, illus., English summary. [Kyoto Univ.]

Distribution and redistribution of Ca^{45} absorbed by rape and sesame plants were investigated. Ca accumulated in the leaves and some was translocated to the husk, but a large part of it accummulated in older leaves and was thus lost at leaf fall.—From English summary.

691 Johansson, N.-O. and Torssell, B. **Field trials with a portable refrigerator.** *Acta agric. scand.* 1956, **6**, No. 1, 81–99, bibl. 12, illus. [Swedish Pl. Prot. Inst., Stockholm, and Inst. Pl. Husb., Roy. Coll. Agric., Ultuna, Sweden]

The portable refrigerator is an insulated bottomless 1m.^{3} box, mounted on wheels, and equipped with an electrically driven motor which can reduce the temperature within to −28°C., if the external temperature is slightly above freezing. One wall contains an observation window. The refrigerator was used for observing in the field the freezing of winter rye and winter oil-crops (turnip, rape [*Brassica campestris* var. *oleifera*] and rape [*B. napus* var. *oleifera*]). The critical temperature for winter rye at the heading stage was −2 to −4°C. There was a reduction in grain yield caused by partial sterility of the ears and a decrease in the 1000-grain weight. Germination was not reduced until a temperature of −6°C. was reached. The critical temperature for injury and yield reduction in winter turnip-rape and winter rape was −4 to −5°C. at the bud stage and −2 to −4°C. at flowering. Both crops suffered stem injury and they formed new green shoots, but rape formed more than turnip-rape.—D.B.

GENERAL

692 Rüther, H. Versuchsergebnisse über den Anbau von Ölfrüchten. [**Results of experiments on the cultivation of oil crops.**] *Landw. Versuchs- u. Untersuchwes.* 1955, **1**, No. 4, 331–9, bibl. 3, illus. [Inst. Landw. Versuchs- u. Untersuchwes., Bad Lauchstädt, E. Germany]

Winter-rape [*Brassica napus* var. *oleifera* sub var. *biennis*] was the highest-yielding oil crop despite the fact that yields fluctuated with weather. (They were influenced favourably by a moist climate.) Peas proved to be the best preceding crop for winter-rape. Poppy [*Papaver somniferum*] had little value as an oil crop in dry regions because yields were so variable. Flax [*Linum usitatissimum*] could be grown in most areas and gave medium yields of grain and of oil. Mustard [*Sinapis alba*] gave high seed- but low oil-yields. As an oil crop, it is of service only when the winter-rape crop has failed. Gold of Pleasure [*Camelina sativa*] produced a good seed yield with a higher oil content than mustard, and is a crop worthy of attention in the future. Spring-rape [*B. napus* var. *oleifera* sub var. *annua*] is limited to coastal regions or other areas having moist air. Sunflower [*Helianthus annuus*] can be grown successfully almost anywhere except coastal zones or at high altitudes.—D.B.

693 Sveshnikova, D. I. N. **Formation of fats in starch grains and plastids.** *Research* 1956, **9**, No. 10, 396–402, bibl. 15, illus. [Acad. Sci., Moscow]

An account is given of experiments designed to establish the mode of fat formation in starch grains of oil-plant seeds. Flax, mustard, *Helianthus annuus* and *Papaver somniferum* were used in the studies. A method of staining, specially developed for this investigation by the author and his collaborators, was employed.—M.P.

LAND USE, SURVEYS AND MANAGEMENT

694 Frison, J. J. and others. Monographie de la région agricole de Meknès. [**Monograph on the agricultural region of Meknes (Morocco).**] *Terre maroc.* 1956, **30,** No. 322 and 323, 269–76 and 311–14.

695 Guillemin, R. Évolution de l'agriculture autochtone dans les savanes de l'Oubangui. [**Evolution of native agriculture in the savannahs of Ubangi (French Equatorial Africa.)**] *Agron. trop., Nogent* 1956, **11,** No. 1, 2 and 3, 39–61, 143–76 and 279–309, bibl. 91, illus., English and Spanish summaries. [See also Abs. 263.]

696† Lignon, R. L'agriculture libanaise et la recherche agronomique. [**Agriculture and agronomic research in Lebanon.**] *Études agron. Lebanon* 1954, **1,** No. 1, 12–34, bibl. 15, illus. [Sta. Agron. Tell-Amara, Lebanon] [Received May, 1956]

697 Beckett, P. H. T. **Agriculture in Central Persia.** *Trop. Agric., Trin.* 1957, **34,** No. 1, 9–28, bibl. 20, illus.

" This description of the general pattern of agriculture in Central Persia is based upon part of the work of an Oxford University expedition to Kerman during July to early September 1950."

698 Johnpulle, A. L. **Agriculture in the Southern Division [of Ceylon].** *Trop. Agriculturist* 1956, **112,** No. 1, 11–24, bibl. 10, illus.

This article deals briefly with topography, soils, climate, land use, cultivation, population, land tenure, rice (including the row-sowing of germinated seeds), cotton and other crops, pests, diseases and livestock. [See also *Fld Crop Abstr.* 10 : 699.]—J.F.C.

699 Jayasundera, E. S. **A survey of agricultural conditions in the north-western division [of Ceylon].** *Trop. Agriculturist* 1955, **111,** No. 4, 267–75. [Received Oct. 1956]

The paper deals briefly with rainfall, water resources, labour problems, land tenure, crops (including the transplanting of rice and the recent introduction of the Japanese method), implements (light, iron ploughs and Burmese harrows), artificial fertilizers, pests and diseases, livestock, poultry and marketing.—D.B.

700† Condon, R. W. and Stannard, M. E. **Erosion in western New South Wales. 1. A general description of the Western Division.** *J. Soil Conserv. N.S.W.* 1956, **12,** No. 4, 192–202, bibl. 3, illus.

The climate, topography, soils, vegetation and erosion occurring in the region are discussed.—M.P.

701† Garrett, H. E. **Present and future farm production in North Canterbury.** *Tech. Publ. 13 Lincoln Coll. N.Z.* 1956, pp. 43, illus.

Statistics of land classification and use, including details of crop- and stock-production for each region, are given.—J.F.C.

702 Stace, V. D. **Western Samoa, an economic survey.** *Tech. Paper 91 S. Pacific Comm.* 1956, pp. 76, bibl. 11, illus.

The survey includes : descriptions of land-use, -policy, -tenure, and social organization ; crop statistics ; changes in agricultural production ; soil erosion and water resources.—J.F.C.

703 White, H. P. **Environment and land utilization on the Accra Plains.** *J. W. African Sci. Assoc.* 1954, **1,** No. 1, pp. 46–62, bibl. 6, illus. [Geography Dep. Univ. Coll. Gold Coast, Achimota, Gold Coast]

704† Muller, J. and others. Possibilités agronomiques des alluvions du fleuve Congo et de ses tributaires. [**Agronomic possibilities of the alluvial soils of the Congo River and its tributaries.**] *Bull. Inform. INÉAC* 1956, **5,** No. 2, 61–77, illus.

Results are given from cultural trials with groundnuts, soyabean, maize, Job's tears, rice and cassava carried out for several years to determine the agronomic possibilities of an area estimated at about 2 million ha. It is thought that the best of these soils are suitable for the mechanized cultivation of crops in alternation with meadows, while others are suitable for the establishment of permanent pastures.—E.B.O.

705 Clayton, E. S. **Research methodology and peasant agriculture.** *Fm Econ.* 1956, **8,** No. 6, 27–32, bibl. 11. [Econ. Res. Div., Nairobi, Kenya]

FARMING SYSTEMS AND PRACTICES

706 Rasmussen, K. and Warley, T. K. **A report on the transplanting of farm crops in Bavaria.** *Publ. Univ. Nottingham, Dep. Agric. Econ.* 1956, pp. 24, illus.

The techniques, results and economy of raising and transplanting selected farm crops in soil cubes is described. The method is used in Bavaria for fodder-beet, kale, mangels, potatoes, sugar-beet and maize. It is of value in extending the range of crops which can be grown in naturally unfavourable areas, e.g. at high altitudes, and in extending the range of crops which can be grown as catch crops in more favourable areas. The man-hours and costs involved are, at present, similar to those in normal husbandry methods. Trials carried out in Bavaria have indicated that satisfactory yields are obtainable from transplanted crops. Root-crops grown for fodder gave yields of roots and tops as high as, or above, those from drilled crops. It was also found that the sugar content of transplanted sugar-beet was up to 2% higher, and noxious-N as much as 50% lower than in the drilled crops. In one trial, mangels yielded 43 tons of roots and 11·4 tons of leaves per ac. Satisfactory yields were also obtained when only the eyes of potatoes were planted in the cubes. Transplanted crops make good progress, show considerable disease- and drought-resistance, and have a shorter growing season than drilled crops.—M.P.

707 Russell, E. W. **The effects of very deep ploughing and of subsoiling on crop yields.** *J. agric. Sci.* 1956, **48,** Pt. 2, 129–44, bibl. 14. [Dep. Agric., Univ. Oxford]

Several depths of ploughing and subsoiling were studied for their effects on the yields of potatoes, sugar-beet, wheat, barley and oats. The crops were grown on a variety of soils and on only 50% of the experimental fields were crop yields increased by ploughing to a depth exceeding 12 in., or subsoiling to about 18 in. Manurial treatment of the fields was found to influence the results. Deep ploughing tended to give better control of many annual and perennial weeds than did shallow ploughing.—M.P.

708† Williamson, W. T. H. and others. **Studies in soil structure in the north-east of Scotland.** *Rapp. Congrès int. Sci. du Sol, Vol. B.* Paris, 1956, 165–71, bibl. 7, German and French summaries. [Dep. Soil Sci., Univ. Aberdeen]

Results from these studies indicated that : (a) different grass species and different varieties of the same species had varied effects on structure ; (b) on a light soil, an 8-course rotation with 4 years grass showed maximum crumb structure after the 4th year under grass and a rapid decline after ploughing up ; a 6-course rotation with 3 years grass was not as effective, the crumb structure in some years after an oat crop being as high as, or even higher, than that after 3 years grass ; (c) on a heavy soil, a peak in the percentage of water-stable aggregates was found in one of the summer months under both long leys and continuous arable cropping ; higher contents of water stable aggregates were found after a long ley, and lower after continuous arable, than after grass on the light soil.—From authors' summary.

709† Hughes, R. and Griffiths, D. J. **The influence of sward composition and sward management on the following oat crop.** *J. Brit. Grassld Soc.* 1956, **11,** No. 3, 147–54, bibl. 1, illus. [Welsh Plant Breed. Sta., Aberystwyth]

The paper is a contribution to a knowledge of the precise effects of ley management, manuring and seeds mixtures on the following crop. This was a fenced plot experiment in which a 5-year ley, which had been subject to different systems of management, was followed by oats, this being the usual arable crop in the high-rainfall regions in the west of Britain. The seeds mixtures of the ley were based on 2 strains of *Lolium perenne*, S24 and Irish. Half the plots were given fertilizer each year, chiefly nitrochalk, in addition to the basic slag applied to all plots at sowing time. The 5-year use of the ley was: (a) heavy sheep grazing or (b) hay followed by light grazing of the aftermath. The plot layout and variants of management are set out diagrammatically. After grazing the ley, the yields of oats, both grain and straw, were substantially higher than after use as hay. The manured plots showed no significant increase in the yield of oats after grazing and even showed lower yields after hay. In spite of the different types of sward associated with the S 24 and Irish strains of *L. perenne*, there was no marked difference in the yield of grain or straw of the oat crop. Sward composition is apparently less important than previous management, as a factor contributing to soil fertility.—D.B.

710 van Parys, A. La culture continue des plantes vivrières à la Station de Nioka. [**The continuous growing of food crops at Nioka Station (Belgian Congo).**] *Bull. Inform. INÉAC* 1956, **5,** No. 2, 87–101, illus.

In the region under study the first two crops are generally good, but the yields of subsequent crops

decline considerably and the fields become infested with *Digitaria vestita*. The usual practice is to restore soil fertility by fallowing. As a result of trials carried out for several years it is concluded that the continuous growing of crops is possible, without lowering yields, by the application of farmyard manure at rates comparable with those applied in Belgium. *D. vestita* is controlled by this intensive cultivation.—E.B.O.

711† Drawert, E. and Steikhardt, H. Zwischenfruchtbau in Thüringen. [**Catch crop cultivation in Thuringia.**] *Z. landw. Versuchs- u. Untersuchwes.* 1955, **1**, No. 5, 454–73. [Inst. landw. Versuchs- u. Untersuchwes., Jena, E. Germany]

Thuringia is divided into zones for catch cropping according to its relief. In the Thuringian basin (140–200 m. alt.) rainfall is the decisive factor and winter catch crops are the surest ones. On heavy soils in this zone the winter catch crop must be one which is removed from the ground early. Undersowing for autumn harvesting does not result in good yields. Higher land, at 200–400 m. alt., is more suitable than the lowland for catch cropping because extremes of climate rarely occur. Harvests can be relied on from stubble-sown crops, undersown crops and winter catch crops. In the foothills (400–500 m.) catch-crop cultivation is limited by the short growing season and the likelihood of early frosts. In the mountainous region (500–700 m.) low temperature and short vegetative period are the limiting factors. Only winter-hardy winter catch-crops and rapidly growing stubble-sown crops (mustard, rape, and spring-rye) can be grown.—D.B.

712† Agerberg, L. S. Växtföljdsproblem i belysning av undersökningar vid försöksgårdarna i Norrbotten. [**The rotation problem in the light of investigations at the experimental farms in Norrbotten.**] *Medd. 50 Stat. JordbrFörsök* 1954, pp. 87, bibl. 85, illus., English summary.

713 Bagley, J. M. and Ciddle, W. D. **Evaluation of sprinkler irrigation systems in northern Utah.** *Bull. 387 Utah Agric. Exp. Sta.* 1955, pp. 30, bibl. 18, illus.

Based on 1954 prices, in northern Utah where a 10 gal./min./ac. irrigation rate was recommended in the hottest season, sprinkler systems cost $75–$85 per acre. More than 40% of the systems examined were inadequate to meet peak watering demands and a further 15% could not do so because of inefficient operation. The costs of operating different power units were examined and the minimum labour requirements were 1 man/hour/acre.—M.H.F.

714 Schwarz, K. Qualitätsbeeinflussung der Ernterzeugnisse durch Bewässerung. [**Influence of irrigation on the quality of crop produce.**] *Dtsch. Landw.* 1956, **7**, No. 9, 448–51, bibl. 8. [Inst. Kulturtech. Humboldt Univ., Berlin und Neustrelitz.]

Studies were made during 1953–5 on the effects of type of irrigation water and quantity and time of irrigation on the yield and composition (quality) of potatoes and cereals grown on light soils. The usual quantities of ordinary water and of sewage effluent used were 3 applications of 20 and 40 mm. Compared with fodder crops [see *Herb. Abstr.* 27:518] the effects on the yield and quality of potatoes were far less definite. The view that starch content is necessarily reduced by effluent was not confirmed. Usually, early irrigation was more favourable than late irrigation, when the crude-protein content was increased and starch reduced, but these trends were less in dry seasons. Lower applications of effluent were preferable to higher because of the N content, while ordinary water was better at the higher rate. Potato varieties differed little in their yield and quality responses. Irrigation of cereals did not occasion marked yield increases, but often caused considerable decreases in 1000-grain weight depending on the species ; e.g. for summer wheat in 1953, unirrigated and irrigated with 60 mm., the respective weights were 32·2 and 23·5 g. In oats, a high degree of sterility was produced. In dry years, a decrease in 1000-grain weight did not necessarily result. Crude-protein content was increased especially as a result of late irrigation ; e.g. for winter rye in 1953, unirrigated and irrigated with ordinary water at 120 mm., the percentages were 10·8 and 11·9 respectively. It was concluded that with well-conducted irrigation no marked injury results from the use of effluent which can be very beneficial where available.—J.F.C.

715† Rui, D. and Romanelli, O. La difesa antigrandine in Italia nell'anno 1955. [**The anti-hail defence in Italy in 1955.**] *Agricoltura d. Venezie* 1956, **10**, No. 10, 519–25.

[See also *Fld Crop Abstr.* 9 : 584.]

WEEDS, WEED CONTROL AND WEEDKILLERS

Where weeds are specific to a crop, see under the crop concerned.

716 Clifford, H. T. **Seed dispersal on footwear.** *Proc. bot. Soc. Brit. Is* 1956, **2**, Pt. 2, 129–31, bibl. 2. [Durham Colleges, Univ. Durham]

A list is given of plants which were raised, within 3 months, from mud scraped from footwear. The list includes plants with many types of dispersal mechanism. *Poa annua* had the greatest frequency. —D.B.

717† Rogers, B. J. and Stearns, F. W. **Preliminary studies on the germination of weed seeds.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 7. [Purdue Univ., Lafayette, Indiana]

718 Klein, W. Untersuchungen zur Bestimmung des Keimungsminimums landwirtschaftlicher Unkräuter. [**Determination of the germination [temperature] minimum of agricultural weeds.**] *Z. Acker- u. Pflbau* 1956, **101**, No. 4, 395–430, bibl. 26, illus. [Inst. Acker- u. Pflbau, Techn. Univ., Berlin-Charlottenburg, W. Germany]

A cabinet for determining germination temperature is described. It is ventilated, but well insulated and thermostatically controlled, and affords accommodation for 160 Petri dishes. Data for 18 agricultural weeds are tabulated. The minimum germination temperature was 1°C., with the following exceptions : *Sonchus oleraceus* and *Matricaria inodora*, 3°C. ; *Galinsoga parviflora* and *Melandrium album*, 5°C. ; *Amaranthus retroflexus* 7°C. The paper includes extensive mathematical treatment of the data.—D.B.

719 Pages, Paulina D. **Germination and germination inhibitors.** *Philipp. Agriculturist* 1955, **39**, No. 5, 260–93, bibl. 25, illus. [Cent. Exp. Sta., Univ. Philipp., Laguna, Philippines]

This study was undertaken to explore the possibility of controlling weeds through inhibition of germination. Four chemicals (MH, 2,4-D, coumarin, and CMU) were tried at various concentrations on seeds of 3 weed species (*Ipomoea triloba*, *Echinochloa crus-galli*, and *Amaranthus spinosus*) and rice. MH suppressed root growth and shoot development of all the species, but was least effective on *Ipomoea*. Being effective on most narrow-leaved plants, especially grasses, MH is not practical in rice fields because the crop may be injured. The most promising chemical was 2,4-D because it required the least concentrations completely to inhibit the seeds. It was more severe on the broad-leaved species, *I. triloba* and *A. spinosus*. The duration of its effectiveness in the soil, however, needs to be known so that seeding of the rice crop can be properly timed. It is clear that coumarin is not a selective herbicide. CMU at concentrations of 2% or below is not a germination inhibitor but a straight-growth inhibitor. It is not a selective herbicide. An attempt was made to relate the mechanism of inhibition by MH to its effect on water absorption. The result seems to indicate that the action of the chemical is linked more with active water absorption rather than with the physical processes of imbibition and diffusion.—From author's abstract.

720† Frey, E. and Guyer, H. Über einige schädliche Unkräuter im Saatgut und deren Bekämpfung. [**Weeds in seed supplies and weed control.**] *Mitt. schweiz. Landw.* 1956, **4**, No. 9, 145–51, bibl. 3, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon]

The quantities permitted in Switzerland of the following weed seeds in seed of agricultural crops are : no seeds of *Cuscuta* spp. in grass and clover seed ; *Rumex obtusifolius*, *R. crispus*, 10 seeds per kg. of grass or clover seed ; *Agrostemma githago*, 10 seeds per kg. of cereal seed, 30 seeds per kg. of legume seed ; *Raphanus raphanistrum*, 20 seeds per kg. of cereal seed ; *Sanguisorba muricata*, 50 seeds per kg. sainfoin, with which it is usually found.—D.B.

721 Tafuro, A. J. and others. **Progress report of crop tolerance period following various rates of amizol (3-amino-1,2,4-triazole) on Ewingsville soil.** *Proc. 9th N.E. Weed Contr. Conf.* 1955, 31–9, bibl. 5.

Two tests are reported on the tolerance of various crops planted at 3, 7, 11, 14, 21, 28 and 49 days after application of amino triazole at 4, 8, 12, 20 and 40 lb. per acre. Detailed records of soil content and rainfall are given. Results are tabulated on the tolerance of the following crops : maize, soyabeans, beets and peas.—From *Weed Abstr.* 4 : 738.

722† Lefort, E. J. E. **Practical aspects of weed-killing by chemicals in tropical crops.** 1955, pp. 30, bibl. 27, Noumea ; South Pacific Commission.

A review is given of herbicides (organic and inorganic) and their uses in the tropics. There are tables showing the susceptibility of some weeds to 2,4-D .—E.B.O.

723† Bragg, K. K. **List of herbicidal products registered [in Canada] as of May 15, 1956.** 1956, pp. 31. [Pl. Prod. Div. Prod. Serv., Dep. Agric. Ottawa]

724† United States Department of Agriculture. **Bibliography of weed investigations for January, February, March, 1956.** *Weeds* 1956, **4**, No. 4, 413–32, bibl. 459. [Fld Crops Res. Br., Beltsville, Maryland]

725† Zick, W. H. and Buchholtz, K. P. **The influence of nitrogen fertilization on the control of quackgrass with herbicides.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 40–2. [Univ. Wisconsin]
The application of N to the rhizomes of *Agropyron repens* stimulated shoot production and this together with the increase in the size of each leaf increased the relative efficiency of the herbicides applied. N (especially as nitrate) stimulates an earlier foliar growth, thus permitting earlier spraying and a longer period for herbicidal decomposition before sowing. From shoot-count data of an experiment in which 3 compounds were compared, the most effective was dalapon, followed by MH and amino triazole, each at 4 lb. per acre. N prolonged the inhibitory effect of MH on the rhizomes. Early-spring application of N seemed to be more effective than late-autumn application. Yields of maize planted 14 days after treatment showed an increase where the number of shoots of *A. repens* decreased.—*Weed Abstr.* 5 : 922.

726 Friesen, G. **The effect of several chemicals applied in the fall for the control of wild oats.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 22–3. [Univ. Manitoba, Winnipeg]
A description is given of 8 experiments in Manitoba to compare the effectiveness of IPC, CIPC, TCA, dalapon, 2,4-D and 3,4-D applied to *Avena fatua* in October and November 1954 and on seedlings of cereals in 1955. CIPC at 10 lb. per acre gave better control of *A. fatua* than IPC at 5 and 10 lb. per acre but had a slightly longer residual toxicity. TCA at 20 and 30 lb. per acre gave excellent suppression of *A. fatua* but no crops could be grown the following year.—*Weed Abstr.* 5 : 907.

727 Leggett, H. W. **Progress report on [cultural and chemical methods of control of] wild oats.** *Proc. 9th W. Canad. Weed Contr. Conf.* 1955, 33–5.

728† Stubbs, J. **Wild oats.** *Outlook on Agric.* 1956, **1**, No. 3, 95–100, bibl. 49, illus.

729 Lee, O. C. **Response of Canada thistle (*Cirsium arvense*) to amino triazole.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 35–6. [Purdue Univ., Lafayette, Indiana]
Amino triazole was applied at 2, 4 and 8 lb. per acre in various volumes during May, June and July to several sites of *Cirsium arvense*. Best kills were obtained when application was made with a minimum of 4 lb. per acre in the early stages of growth or up to the bud stage. Volume rates of 30 gal. per acre applied from a knapsack were superior to applications of 10 gal. per acre from a boom field-sprayer. Clipping reduced the effectiveness of the treatment. The application of 4 lb. per acre amino triazole together with 2 lb. per acre 2,4-D was inferior to treatment with 4 lb. per acre amino triazole alone. No injury to maize and soyabeans was noticed when planted 14 days or more after spraying.—*Weed Abstr.* 5 : 917.

730 Ham, G. F. and others. **Controlling Canada thistle with late fall treatments of herbicides.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 36–7. [Ohio Agric. Exp. Sta., Wooster]
Under Ohio conditions the application of heavy rates of 2,4-D (up to 40 lb. per acre) applied in the autumn for the control of *Cirsium arvense* were not successful. Amino triazole at 8 lb. per acre applied in the late autumn gave nearly 100% control the following May and eleven months later there was still a 50% reduction in stand of *C. arvense* in undisturbed plots.—*Weed Abstr.* 5 : 918.

731 Rasmussen, L. W. **The effects of 2,4-D and 2,4,5-T applications on the stand density of Canada thistle (*Cirsium arvense* Scop.).** *Weeds* 1956, **4**, No. 4, 343–8, bibl. 6, illus. [Washington Agric. Exp. Sta., Pullman]
From 1948–51 ester formulations of 2,4-D and 2,4,5-T were applied annually at 3 rates (1·2, 2·4 and 3·6 lb. acid equivalent per acre) and at 3 growth-stages (bud, bloom and mature plant) to plots infested with Canada thistle. In 1949 there was no detectable stand reduction, but by 1952 (after 4 applications) there was a marked reduction with all treatments. The most effective treatments were with 2,4-D at 2·4 and 3·6 lb. a.e. per acre.—G.M.W.

732 Moss, E. H. Ragweed in southeastern Alberta. *Canad. J. Bot.* 1956, **34**, No. 5, 763–7, bibl. 4, illus. [Univ. Alberta, Edmonton]
There are 2 major, and quite separate, regions of infestation by ragweed (*Ambrosia artemisiifolia* var. *elatior*) in southeastern Alberta and adjacent Saskatchewan. The possible spread of ragweed should be recognized as a potential danger owing

to the prevalence of suitable habitats. The success of its spread northward offers an interesting study because the shortness of the frost-free season could prevent seed production. In Alberta, ragweed can persist further north (55°30′) than in Eastern Canada or Europe (50°).—D.B.

733 Standifer, L. C. and Ennis, W. B. **Developmental studies on sodium 2,2-dichloropropionate as an herbicide for Johnson grass.** *Proc. 9th S. Weed Contr. Conf.* 1956, 183–9, bibl. 5. [Mississippi Agric. Exp. Sta., State College]

In field experiments, dalapon at 8 lb./ac. in conjunction with normal cultivation gave about 90% control of *Sorghum halepense*. Cotton tolerated 8–16 lb./ac. Translocation studies with maize showed that considerable movement still occurred 24 hr. after application but little after 48 hr. Under conditions of high humidity entry appeared to be more rapid than under dry conditions. —From *Weed Abstr.* 5 : 1054.

734 Hauser, E. W. and Thompson, J. T. **Progress report on control of established Johnson grass [*Sorghum halepense*] with chemicals and cropping.** *Proc. 9th S. Weed Contr. Conf.* 1956, 190–6, bibl. 3. [Georgia Exp. Sta., Experiment]

Two applications of dalapon, each at 5 lb./ac., appeared to be more effective than single applications of 10, 15 or 20 lb./ac. There was no marked difference between April and July application to young, actively growing leaves. Sodium 2,2,3-trichloropropionate was less effective than dalapon at equal rates. Application in 35 gal./ac. water was adequate even when the weed was 5 ft. high, a wetter (Tergitol) was added at 0·5%.—*Weed Abstr.* 5 : 1055.

735 Foy, C. L. and Miller, J. H. **Chemical control of Johnson grass.** *Proc. 9th S. Weed Contr. Conf.* 1956, 197–203, bibl. 3. [Univ. California, Davis]

Dalapon alone was better than amino triazole together with dalapon or alone. Split treatments of 20 + 20 lb./ac. applied to vigorously growing *Sorghum halepense* in the full vegetative to flower stages were better than a single application of 40 lb. or two of 10 lb. Low soil moisture, insufficient vegetative growth, senescence, discing or burning decreased the effect of dalapon. Mowing before spraying or oiling or mowing after spraying was not advantageous. MH was only effective if applied to vigorous young regrowth.—*Weed Abstr.* 5 : 1056.

736† Stamper, E. R. and Melville, G. **Studies in the control of nutgrass (*Cyperus rotundus*.)** *Proc. 9th S. Weed Contr. Conf.* 1956, 220–4, bibl. 4. [Louisiana Agric. Exp. Sta., Baton Rouge]

737† Hollingsworth, E. B. and Ennis, W. B. Jr. **Studies on nutgrass [*Cyperus rotundus*] response to 3-amino-1,2,4-triazole and cultural practices.** *Proc. 9th S. Weed Contr. Conf.* 1956, 204–10, bibl. 2. [Mississippi Agric. Exp. Sta., State College]

738 Arai, M. and Kataoka, T. **Ecological studies on *Alopecurus aequalis* Sobol.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1956, **24**, No. 4, 275–8 and 319–23, bibls. 9 and 4, illus., English summaries. [Kanto-Tosan Agric. Exp. Sta.]

A. aequalis is a noxious weed of wheat and barley cultivated on drained paddy fields. Environmental conditions for its emergence were studied. The optimum soil-moisture content was 80% saturation level, which is higher than required for wheat ; the optimum soil temperature was 15°C. (min. 5°C. and max. 23°C.) ; the maximum depth for emergence was 4 cm. which is shallower than required for wheat. The number of viable seeds in the top layer of soil decreased rapidly after autumn drainage. Control measures recommended are tillage in late autumn and late sowing of the cereal crop.—From English summaries. —D.B.

739† Meadley, G. R. W. **Weeds of Western Australia. Paterson's Curse.** (*Echium plantagineum* and *E. italicum* L.). *J. Dep. Agric. W. Aust.* 1956, **5**, No. 5, 549–52, illus.

A description of these weeds and of their occurrence and importance in Western Australia is given. On small areas in the light rainfall districts, application of a 5% solution of atlacide or arsenic pentoxide at 100 gal./ac., when the plant is at the early flowering stage is satisfactory. Control of the weed in cereal crops can be achieved by low volume application of 12 oz. a.e. 2,4-D amine/ac., when the plant is at the rosette stage.—M.P.

740 Choudhuri, H. C. **"Mercene Special" as eradicator of water-hyacinth.** *Sci. and Cult.* 1956, **22**, No. 1, 49–52, bibl. 5, illus. [State Agric. Res. Inst., Calcutta]

In pot experiments, water hyacinth [*Eichhornia crassipes*] was successfully killed in 14 days with 2 oz. mercene special or 0·75 oz. mercene special A dissolved in 4 gal. water. The latter killed and disintegrated 100% of the plants even if artificial rain was applied 3 hr. after treatment. Both herbicides proved to be more highly selective than 2,4-D or methoxone and killed the water hyacinth only, even though other weeds were present. These new herbicides are aqueous alkaline solutions of an arsenic salt.—D.B.

741 Granström, B. and Almgård, G. Studier över den svenska ogräsfloran. **Studies of the Swedish weed flora.** *Medd. 56 Stat. JordbrFörsök* 1955, 187–209, bibl. 35, English summary, 207–8.

Material from 382 weed control trials is analysed. The most frequent weeds in winter cereals are *Tripleurospermum maritimum* v. *inodorum*, *Centaurea cyanus*, *Stellaria media* and *Lamium* sp. The most frequent in spring-sown cereals are *Chenopodium album*, *Galeopsis* sp., *Spergula arvensis*, *Stellaria media*, *Polygonum lapathifolium* ssp. *pallidum* and *Thlaspi arvense*, while frequent cruciferous weeds are *Sinapis arvensis* and *Brassica campestris*. Weeds dominant in spring-sown crops in north Sweden are *Chenopodium album*, *Galeopsis* sp., *Stellaria media* and *Spergula arvensis* ; the cruciferous weeds are relatively rare. Compared with other parts of Sweden, the farm districts of middle and south Sweden have a weed flora with a large number of species. Flowering period has been studied in connexion with the use of chemical weedkillers and the risk of poisoning pollinating insects. In winter cereals, the principal weeds flowering during the spring are *Stellaria media*, *Lamium* sp. and *Viola arvensis*, and later on *Thlaspi arvense*, *Centaurea cyanus*, and *Tripleurospermum maritimum* v. *inodorum*. In spring-sown crops flowering cruciferous weeds may be found a month after sowing.—G.M.R.

742 Friesen, H. A. **MCP vs 2,4-D for the control of weeds in grain crops.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 23–4. [Exp. Fm, Lacombe, Alberta]

Three formulations each of MCPA and 2,4-D were compared at 4 and 8 oz. per acre on 2 dates on annual weeds in oats, barley and flax. All formulations were more effective when applied during the seedling stage while 2,4-D was superior to MCPA, each formulation giving satisfactory control of *Chenopodium album*, *Sinapis arvensis*, *Thlaspi arvense* and *Axyris amaranthoides*. 2,4-D gave only a temporary set-back to *Galeopsis tetrahit* while the MCPA formulation killed some 30% of the plants. Yields of flax and oats were significantly higher in the MCPA plots than in the 2,4-D, except in one trial where the predominant weed was *Salsola kali*. The highest yields at the early treatment date were obtained with 2,4-D amine and esters and only at the late stage did MCPA increase the yield. The maturity of flax was delayed 4–11 days by 2,4-D (esters) and 2 days by MCPA.—*Weed Abstr.* 5 : 908.

743† Warden, R. L. and Davidson, J. H. **Performance of erbon for extended vegetation control in the North Central States.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 62–3. [Dow Chem. Co., Midland, Michigan]

From tests during 1955 it is concluded that seasonal control of average grass and broadleaf vegetation required 120–160 lb. per acre of erbon (2-(2,4,5-trichlorophenoxy) ethyl-2,2-dichloropropionate). For maximum effectiveness it should be applied in late spring or early summer when vegetation is growing vigorously and light rainfall is probable. Species less readily controlled by erbon include *Cirsium arvense*, *Plantago* spp. and *Rumex* spp.—*Weed Abstr.* 5 : 948.

CROP BOTANY

744† Proceedings of the International Seed Testing Association. **International rules for seed testing.** *Proc. internat. Seed Test. Ass.* 1956, **21**, No. 1, 1–80.

The rules given here were adopted by the meeting of the International Seed Testing Association held in Dublin on 29 May, 1953, and revised at the Paris meeting on 8 June, 1956. Earlier International Rules for Seed Testing were cancelled.—E.B.O.

745† Fukui, J. and Ono, H. **Studies on the adaptability of green manure and forage crops to paddy field conditions. 2. Germination of their seeds in relation to the length of the periods of soaking.** *Proc. Crop Sci. Soc. Japan* 1955, **24**, No. 2, 108–10, bibl. 4, English summary. [Kanto-Tosan Agric. Exp. Sta.]

Twenty-nine species of genera in the Leguminosae, Gramineae and Cruciferae were used. The view that seeds of small-seeded species show a tendency to germinate when submerged under water was found to be not always true. According to the relationship between length of soaking period and germination capacity, plants may be classified as tolerant, medium and non-tolerant. Usually, the Cruciferae are tolerant, Gramineae are non-tolerant and Leguminosae are either tolerant or non-tolerant.—From authors' summary.

746 Le Tourneau, D. and others. **The effect of aqueous extracts of plant tissue on germination of seeds and growth of seedlings.** *Weeds* 1956, **4**, No. 4, 363–8, bibl. 6, illus. [Univ. Minnesota, St. Paul]

Aqueous extracts of dried plant material representing 23 species inhibited wheat germination and growth of germinating wheat and peas. This inhibition appears to be due to materials in the

extracts. All such inhibitors were present after autoclaving and are at least partially water soluble. —Authors' summary.

747 Schieferstein, R. H. and Loomis, W. E. **The surface wax of leaves.** *Proc. 12th N. Cent. Weed Contr. Conf.* 1955, 2. [Iowa Agric. Exp. Sta., Ames]

The development of wax deposits on the primary leaf of young maize plants was studied in detail. Wax regeneration was demonstrated on young cabbage leaves which had been cleaned by wiping with dry cotton. Mature leaves of a number of plant species were studied and it was found that closely related plants usually had similar surface patterns, but sometimes there was a wide variation even between plants of the same genus. A list of wax-bearing and non-wax-bearing plants is included.—*Weed Abstr.* 5 : 885.

748 Böhning, R. H. and Burnside, Christel A. **The effect of light intensity on rate of apparent photosynthesis in leaves of sun and shade plants.** *Amer. J. Bot.* 1956, **43**, No. 8, 557–61, bibl. 4, illus. [Ohio State Univ., Columbus]

Amongst the plants used in this study were soya-bean, sunflower, cotton and bean (*Phaseolus vulgaris*). The rate of apparent photosynthesis was measured in plants exposed to similar conditions of light, temperature, moisture and CO_2 supply. Light saturation points and compensation points (apparent photosynthesis zero), for the sun species were 2000–2500 ft.–c. and 100–150 ft.–c., respectively.—G.M.W.

749† Ziemieka, J. M. and Maliszewska, W. L'occurrence des azotobacters dans la rhizosphère des différentes plantes et leurs relations mutuelles. [**The presence of *Azotobacter* in the rhizosphere of different plants and their mutual relationship.**] *Rapp. Congrès int. Sci. du Sol, Vol. C.* Paris, 1956, 367–9, English and German summaries. [Sect. Microbiol. Inst. Pédol., Pulawy, Poland]

Results from trials carried out for several years, in which many plant species were inoculated with different strains of *Azotobacter*, indicated that some species, including *Brassica oleracea* and *Sinapis alba*, benefited from this treatment (increases in yield of 10–250% were recorded), whilst wheat was not affected.—E.B.O.

750† Parmeijer, W. L. **Painting exposed roots *in situ* for photographing.** *Qd J. agric. Sci.* 1956, **13**, No. 1, 66–7, bibl. 1, illus. [Ayr Reg. Exp. Sta., Qd]

A modification of a technique described by Hass and Rogler (*Agron. J.* 1953, 45, 173) suitable for the soil conditions at Ayr is described.—M.P.

751† Selman, I. W. and Foster, J. C. **The Wye College plant growth rooms.** *J. hort. Sci.* 1957, **32**, No. 1, 49–52, bibl. 1, illus. [Wye College, Kent]

The construction details and performance are given for 3 growth rooms each designed to accommodate 60–80 plants in 3-in. pots. When the rooms are illuminated (at a light intensity adequate for normal plant development), temperature control may be obtained at any level between 35°F. and 90°F.—From authors' summary.

752† Schein, R. D. and others. **A thermistor-equipped psychrometer for plant research.** *Pl. Dis. Reptr* 1956, **40**, No. 11, 929–33, bibl. 4, illus. [Pl. Path. Dep., Pennsylvania State Univ., University Park, Pa]

A thermistor-equipped psychrometer suitable for field use in studying temperature and atmospheric moisture factors influencing development of epiphytotics is described.—From authors' summary.

753† Parameswaran, S. **An apparatus for the determination of the water requirements of crops.** *Curr. Sci.* 1956, **25**, No. 8, 250–2, illus. [Div. Agric. Meteorology, Poona-5, India]

A continuous-recording apparatus, which employs an electronic technique, measures losses of water from crops and soil. The apparatus is described and a brief account is given of its use for determining water losses from *Sorghum* grown in tanks. The apparatus works satisfactorily in the field.—D.B.

754 Bolle-Jones, E. W. **A glasshouse suitable for physiological investigations on plants grown in the tropics.** *Emp. J. exp. Agric.* 1956, **24**, No. 96, 331–9, bibl. 3, illus. [Rubber Res. Inst., Malaya]

755† Georlette, R. Littérature relative à l'emploi des isotopes radioactifs dans l'étude de la nutrition des plantes cultivées. [**Literature on the use of radioactive isotopes in the study of nutrition of cultivated plants.**] *Ann. Gembl.* 1956, **62**, No. 4, 351–71, bibl. 248.

756† Balba, A. M. and Haley, L. E. **Comparison of results obtained by the Balba-Bray equation and radioactive techniques for the determination of nutrient uptake by plants from different nutrient forms.** *Soil Sci.* 1956, **82**, No. 5, 365–8, bibl. 8. [Dep. Agron., Univ. Illinois]

The calculated values of P-uptake by plants from the soil P and the applied superphosphate were found to agree with the results obtained from radioactive techniques.—From authors' summary.

757† Williams, K. T. and Bevenue, A. **Problems and techniques in the analysis of plant material for hemicellulose.** *J. Ass. off. agric. Chem., Wash.* 1956, **39**, No. 4, 901–18, bibl. 148. [Agric. Res. Serv., U.S. Dep. Agric., Albany 10, Calif.]

758† Scharrer, K. and Munk, H. Die quantitative Bestimmung kleinster Mengen Zink in Böden, pflanzlichen und tierischen Substanzen und Düngemitteln. [**The quantitative determination of minute quantities of zinc in soil, plant and animal substances, and in manures.**] *Z. PflErnähr. Dung.* 1956, **74**, No. 1, 24–42, bibl. 21, illus. [Justus-Liebig-Hochsch., Giessen, W. Germany]

759† Griffith, G. ap and Thomas, D. C. **Description of Kjeldahl routine at the Welsh Plant Breeding Station.** *Lab. Pract.* 1956, **5**, No. 12, pp. 454–5, illus.
The analysis of each sample takes 4 days to complete and 2 operators deal with 96 determinations per day.—From authors' summary.

760 Pisano, J. J. **Assay methods for the determination of protein quality. 2. Extraction of plant proteins with sodium lauryl sulfate.** *Diss. Abstr.* 1956, **16**, No. 8, 1335. [Rutgers Univ., N.J.]
The substance was successfully used for the extraction of protein from the seeds of wheat, oats, maize, soyabeans and peas.—From abstract.

761 Isherwood, F. A. and Niavis, C. A. **Estimation of α-keto acids in plant tissue : a critical study of various methods of extraction as applied to strawberry leaves, washed potato slices and peas.** *Biochem. J.* 1956, **64**, No. 3, 549–58, bibl. 9. [Univ. Cambridge]

762† Pirie, N. W. **Biochemical engineering.** *Research* 1957, **10**, No. 1, 29–34, bibl. 6, illus. [Rothamsted Exp. Sta., Harpenden, Herts]
The role of biochemical engineering, both in the mechanical extraction of certain primary products from plant materials and the subsequent conversion of the residues, is discussed. The author describes the method in use at Rothamsted for the large-scale separation of protein from fresh leaves, and indicates some possible uses and conversions of the residue.—M.P.

763† Morgan, D. G. and Mees, G. C. **Gibberellic acid and the growth of crop plants.** *Nature, Lond.* 1956, **178**, No. 4546, 1356–7, bibl. 3, illus. [ICI Ltd. Jealott's Hill Res. Sta., Bracknell, Berks]
Although in small-scale experiments the application of gibberellic acid to many plant species produces an increase in crop yield, the results of field trials on a large scale during a 3-year period show that the greater growth of aerial parts in treated arable crops is not accompanied by increases in crop yields.—M.H.

764 Hamilton, R. H. and others. **Selective inhibition of the geotropic response by *n*-1-naphthylphthalamic acid.** *Physiol. Plant.* 1956, **9**, No. 4, 546–58, bibl. 13, illus. [Dep. Bot. and Pl. Physiol., Michigan State Univ., East Lansing]
A disproportionate inhibition of straight growth and geotropic curvature was found in roots and shoots of maize and pea (*Pisum sativum*), treated with the acid (NP), but not in NP-treated oat coleoptiles, or in maize roots treated with 2,4-dichloro-phenoxyisobutyric acid. The close correlation between growth and curvature expected on the Went-Cholodny theory was not obtained.—From authors' summary.

765 Mer, C. L. **Futher observations on the effect of carbon dioxide on the growth of etiolated *Avena* seedlings.** *Ann. Bot., Lond.* 1957, **21**, No. 81, 13–22, bibl. 11, illus. [Imp. Coll. Sci. Tech., London S.W.7]
[See also *Fld Crop Abstr.* 3 : 952.] Oat seedlings when grown in 5% CO_2 show an increased growth of the mesocotyl and a reduced growth of the coleoptile. To elucidate this effect the following data, for both treated and control plants, have been obtained : (1) fresh and dry weight increases in the whole plants and in the separate organs, (2) water contents, and (3) progressive depletion of the endosperm. The enhanced growth of the mesocotyl in CO_2 was closely correlated with dry-matter content but not with water content. The depletion of the endosperm was reduced by treatment with CO_2, and of the smaller amount of carbohydrate entering the embryo a higher proportion remained in the mesocotyl ; coleoptile growth was consequently diminished. The distribution of dry matter between the coleoptile and mesocotyl must be an important factor in their reciprocal growth behaviour.—Author's abstract.

766† Bolli, M. Esperienze di respirazione e di pressione osmotica nei vegetali sottoposti all'azione dell'acido ascorbico e dell' acido indolacetico. [**Trials to study respiration and osmotic pressure in plants**

treated with ascorbic acid and indolacetic acid.] *Ann. Fac. Agr., Perugia* 1954, **10**, 248–51, bibl. 6. [Ist. Bot. Univ. Perugia, Italy] [Received Aug., 1956]

Results from trials which included wheat, maize, field beans and lentils, indicated that respiration (quantity of O_2 absorbed by 1 g. of dry matter in 1 hr.) was increased by treatment with ascorbic acid, and, to a lesser degree, by treatment with indolacetic acid. Treatment with ascorbic acid showed a marked tendency to lower the osmotic pressure of the plants ; this tendency was less marked with indolacetic acid.—E.B.O.

767 ZIMMERMAN, P. W. Chemicals involved in air-pollution and their effects upon vegetation. [Reprint from] *Proc. Gov. Conf. Exhibit on Atmospheric Pollution. N.J.*, bibl. 33, illus. [Boyce Thompson Inst. Pla. Res., Inc., N.Y.]

Plants often indicate impurities in the air by specific responses, but symptoms of chemical injury frequently resemble those due to disease. The following impurities are considered : SO_2, HF, Cl_2, H_2S, NH_3, C_2H_4, CO, Hg vapour, and the vapour of 2,4-D and other hormone-like chemicals. To aid identification of the characteristic effects, several plant species were subjected to known gases under controlled experimental conditions. SO_2, HF and Cl_2 caused mottling and streaking and were not always distinguishable in these effects, H_2S caused scorching of the youngest leaves, and NH_3 general discolouration. Turgid plants proved more susceptible than wilted plants to SO_2, HF and Cl_2, and sensitivity of the older leaves was greater. H_2S attacked the young leaves first, and NH_3 all leaves alike. Previous light conditions and current temperature conditions affected sensitivity to SO_2. Seven hours of SO_2 at 0·4 ppm. affected buckwheat (*Fagopyrum esculentum*), which, like sweet-potato (*Ipomoea batatas*) was relatively sensitive; barley, oats, and rye being less so, and maize and turnip (*Brassica rapa*) still less. Marked differences in varietal response were shown e.g. one variety of sweet-potato was severely injured by SO_2, but not by HF, while another behaved conversely. It was found that SO_2 increased the growth-rate of S-deficient plants. Maize, some varieties of sweet-potato and buckwheat, proved susceptible to HF, beans were moderately so, and some varieties of sweet-potato were resistant. The toxic effects of illuminating gas were found to be caused by C_2H_4 and not by CO, which is toxic only at high concentrations. The vapour from esters of 2,4-D, 2,4,5-T etc. proved toxic and individually recognizable by specific symptoms.—J.F.C.

768 REES, W. J. and SIDRAK, G. H. **Plant nutrition on fly-ash.** *Plant and Soil* 1956, **8**, No. 2, 141–59, bibl. 17, illus. [Bot. Dep. Univ., Birmingham, England]

Fly-ash is a waste product of the combustion of pulverized coal at power stations. Barley grown on the ash accumulated excessive amounts of Al and Mn and exhibited the toxicity symptoms of both. P-deficiency symptoms induced by Al resulted even on the addition of excess soluble P. The addition of NP and K to the ash increased yields but not up to the normal level. The barley showed symptoms at 4% ash content in the soil and a reduction of yield at 7%. Mangels [*Beta vulgaris*] and mustard [*Sinapis alba*] gave enhanced yields up to 12 and 50% of ash, respectively, in soil/ash mixtures. The mangels were quite normal in appearance. Mustard plants grew much more vigorously on the mixture than on either alone but had typical symptoms of Mn-toxicity.—J.F.C.

MISCELLANEOUS

769† FAO. **The state of food and agriculture 1956.** Rome, 1956, pp. 143, bibl. in text, illus.

This publication describes : regional agricultural production in 1955–6, including per caput food supply, developments and patterns of production ; economic activity and the demand for agricultural products ; international agricultural trade, including price-trends in international markets and factors affecting them ; farm incomes and retail prices ; agricultural policy and development planning in 1955–6. Appendices include regional statistics on production, exports and imports.—J.F.C.

770† GERLACH, W. Die Auswirkung der Atomkernenergie auf die Wirtschaft unter besonderer Berücksichtigung der Landwirtschaft. [**The effect of nuclear energy on the economy especially agriculture.**] *Bayer. landw. Jahrb.* 1956, **33**, No. 3, 259–70. [Univ. München, W. Germany]

771† SANSOM, H. W. and others. **Report on experiments on artificial stimulation of rainfall at Mityana, Uganda. September-December, 1954.** *Mem. 3, No. 4 E. Afr. met. Dep.* 1955, pp. 6, bibl. 4, illus. [Received Aug., 1956]

A successful cloud-seeding experiment is described and discussed. On 24 occasions out of 33, rain followed the seeding of clouds with finely-ground

pure NaCl dispersed within the cloud by means of a hydrogen-filled balloon bomb. It was noticed that the rainfall tended to decrease downwind from the release point on the control days, whereas there was a very definite increase downwind on the seeding days. The resultant increase in rainfall appeared to amount to some 2–3 in.—M.P.

772† Le Roy, H. L. Zwei bekannte statistische Prüfverfahren im Lichte neuester Erkenntnisse. [**Two statistical tests in the light of most recent knowledge.**] *Schweiz. landw. Mh.* 1956, **34,** No. 6, 285–97, bibl. 5, illus. [Eidg. Tech. Hochsch., Zürich]

By means of 3 examples, the new so-called sequential range test and the sequential F test are presented. These new methods give a more sensitive test than the present t- and F- tests. The application, advantages and disadvantages of the new methods are discussed.—D.B.

773† Njos, A. and Nissen, O. **Standard errors of field experiments at the Farm Crop Institute, Agricultural College of Norway.** *Agron. J.* 1956, **48,** No. 9, 416–8, bibl. 2. [FCI, Agric. Coll. Norway, Vollebekk]

774† England and Wales. Ministry of Agriculture, Fisheries and Food. **Crop Protection Products Approval Scheme. Approved List 1956.** *Publ. England and Wales Minist. Agric., Fish., Fd* 1956, pp. 33.

775 Lowe, A. D. **Recommendations for the control of insect pests on Brassica crops in New Zealand.** *N.Z. J. Agric.* 1956, **93,** No. 4, 341–53, bibl. 6, illus.

Particular attention is paid to the insecticides available, and to the methods of ground and aerial application of the chemicals in use, for the control of pests on rape, swedes, and turnips.—M.P.

776† Cooke, G. W. (Ed.) **Field experiments on phosphate fertilizers. A joint investigation.** *J. agric. Sci.* 1956, **48,** No. 1, 74–103, bibl. 12. [Rothamsted Exp. Sta., Harpenden, Herts]

The action of various phosphate fertilizers are summarized and are discussed with reference to soil types. Crops used in the tests were swedes, potatoes, sugar-beet and cereals.—G.M.W.

777 Richardson, H. L. **Field experiment programmes.** *Outlook on Agric.* 1956, **1,** No. 3, 87–94, bibl. 26.

The importance in a nation's economy of large-scale field experiments is discussed with particular regard to the value of sound fertilizer programmes. The changing nutrient status of soils and the development of new crop varieties with different nutrient requirements necessitates a continuing and flexible fertilizer programme. Examples of simple and complex fertilizer experiments are cited.—M.P.

778† Tourte, R. and others. Perfectionnement des techniques culturales au Sénégal. [**Improvement of cultural methods in Senegal.**] *Bull. agron. 13 Fr. d'out. mer* 1956, 3–111, illus.

This is a synopsis of results obtained from 1949 by the Centre de Recherches Agronomiques de Bambey. It is concerned with the following principal aspects : climate, soils and rural environment of Senegal ; soil cultivation ; green manuring ; fertilizers ; seeds and sowing ; farming systems.—E.B.O.

779 Naude, C. P. and others. **Fertiliser and irrigation experiments at the Upington Agricultural Research Station [S. Africa] 1942-1952.** *Sci. Bull. 359* (*Chem. Ser.* 202) *Dep. Agric. S. Afr.* 1955, pp. 42, illus. [Received Sept., 1956]

This is a progress report on fertilizer trials with maize, wheat, soyabeans and groundnuts ; results are tabulated and discussed. The groundnut variety Natal Common gave a higher yield of kernels, and had a higher kernel content, than Virginia Bunch ; the latter variety had a higher mineral content.—M.P.

780 Wort, D. J. **The foliar application of nutrients with 2,4-D.** *Proc. 9th W. Canad. Weed Contr. Conf.* 1955, 22–8.

781† Haswell, G. A. and Oxley, T. A. **A thermocouple spear for temperature measurement in stacks of bagged produce.** *Trop. Agric., Trin.* 1957, **30,** No. 1, 55–8, illus. [D.S.I.R. Pest Infest. Lab., Slough, Bucks]

The design of the thermocouple spear to determine the temperature of a bagged commodity at depths down to about 20 ft. in a stack is described. —From authors' summary.

782 Lyman, C. M. and others. **Essential amino acid content of farm feeds.** *J. agric. fd Chem.* 1956, **4,** No. 12, 1008–13, bibl. 18. [Texas Agric. Exp. Sta., Agric. Mech. Coll. System, College Sta., Tex.]

Tables include figures of amino-acid content of seed of the following : barley, buckwheat [*Fagopyrum esculentum*], maize, sorghum, hog millet [*Panicum miliaceum*], oats, rice, rye, wheat, soyabeans and cowpeas [*Vigna sinensis*].—J.F.C.

REPORTS

The notes below indicate the main investigations in the reports covered, in so far as they concern this journal. Where a separate abstract has been made from a particularly interesting section of a report, this is indicated.

783 **Great Britain.** Norfolk Agricultural Station. 48th Annual Report 1955–56. Sprowston, 1956, pp. 22.

INVESTIGATIONS REPORTED :

1. Value of organic manuring in an arable rotation, pp. 8–11. The results of 20-years' experiments showed that applying a total of 11 tons of dung over a 4-year rotation increased the yield of all the test crops (sugar-beet, barley, wheat and hay), and that, for cereals, the application of straw was also of benefit. Neither treatment made a permanent contribution to soil fertility.
2. Seed-rate, row-width and N for winter wheat, pp. 11–12. Results with Hybrid 46 confirmed those of the previous years. [See *Fld Crop Abstr.* 9 : 644.] The 4-in. rows produced 0·7 sacks [1 sack = 252 lb.] of wheat per ac. more, and the 12-in. rows 0·9 sacks per ac. less, than the standard 8-in. rows.
3. Cereal cultivation experiments, p. 13. Results with the spring-sown wheat variety Atle indicated that a seed rate of 2–5 bu. per ac. is better than either 1·5 or 3·5 bu., and that 4 cwt. of nitro-chalk appear to be the economic limit in most years ; there was little benefit from split dressings.
4. Sugar-beet experiments, pp. 13–16. The field germination of commercial 7—11/64ths rubbed seed was improved 10% after grading by gravity separation. Spraying IPC at 3 lb. per ac. just after drilling again gave excellent control of chickweed and knotgrass, but not of other important weeds. TCA at 6lb. per ac., worked thoroughly into the seed-bed before drilling, gave good-to-excellent control of wild oats with only a slight effect on the crop.
5. Potato experiments, p. 15. The most economical manurial treatment for King Edward and Majestic potatoes was the broadcasting of 4·5 cwt. sulphate of ammonia, 6 cwt. superphosphate and 3 cwt. muriate of potash per ac., on the ridge before planting.
6. Vining peas, pp. 15–16. As in the previous year, there was no benefit from 1·5–3 cwt. N per ac. applied to the seed-bed. DNPB at 2 lb. per ac. sprayed at the 3-true-leaf stage gave better weed control than MCPB, and had no effect on crop yields or maturity. In experiments at Ingham, IPC at 3 lb. and TCA at 6 lb. per ac. gave good control of weeds in peas, but TCA was more harmful to the crop.
7. Crop variety testing, pp. 16–18. Palu was a promising spring-oat. The spring-wheats Svenno and Peko were superior to the control, Atle, and have been provisionally recommended —M.P.

784 **Great Britain.** Hasler & Co. Ltd., Essex. Seventh report of trial and experimental work carried out at Throws, Little Dunmow, 1954–55. By P. R. Hayward, [n.d.], pp. 31. [Received Nov., 1956]

INVESTIGATIONS REPORTED :

1. Spring-barley trial, pp. 6–8. Of 10 varieties on trial, the leading 7 varieties gave similar yields, headed by Rika and Proctor with 44·2 cwt. per ac.
2. Small-scale winter-barley trial, pp. 8–10. Rika gave the highest yield, 57·2 cwt. per ac., and was not affected by winter-killing. Proctor yielded 51·4 cwt. per ac. but was susceptible to severe winter-killing, as, to a lesser extent, was Plumage Archer. Pioneer and Urania were relatively winter-hardy, but gave lowered yields owing to severe lodging.
3. Winter beans, pp. 10–13. The Throws (M.S.) stock again significantly outyielded most other stocks on trial, and gave 33 cwt. per ac., followed by S/II/47/ESL/51, (N.I.A.B. " C " stock) which yielded 32·5 cwt. per ac.—M.P.

785 **Northern Ireland.** Agricultural Research Institute of Northern Ireland, Hillsborough, Co. Down. Twenty-ninth Annual Report, 1955–6. [n.d.], pp. 44, illus. [Received Nov., 1956]

INVESTIGATIONS REPORTED :

1. Barley varieties and manuring, p. 27. Herta again substantially outyielded Ymer, Freja and Proctor. Grain yields were increased by N applications of up to 2·25 cwt. ammonium sulphate per ac. ; 2 cwt. muriate of potash per ac. increased grain yields by 2 cwt. per ac.
2. Weed control, pp. 28–9. The effects of MCPA, MCPB and 2,4-D, at 0·5, 1·5 and 2·5 lb. a.e. per ac., applied at 10, 35 and 60 gal. per ac., were compared on two species of weed and on flax. 2,4-D gave the best control of spurrey [*Spergula arvensis*] and of redshank [*Polygonum persicaria*]. Best kill was achieved at the higher levels of herbicide concentration, but the volume of application, contrary to results in the previous year, had no apparent influence on the degree of control achieved. Similar results were noted with flax ; low-volume application gave the most pronounced distortion. Increasing kill of the tops of broad-leaved docks [*Rumex obtusifolius*] was obtained with increasing levels of MCPA (12·5–50 oz. a.e. per ac.), and, to a lesser extent, with each increase in the volume of application (5–50 gal. per ac.). Regrowth occurred in all treatments.—M.P.

786 **France.** Institut National de la Recherche Agronomique. Travaux effectués par les stations agronomiques en 1954. [**Work of the agronomic stations in 1954.**] *Ann. Inst. nat. Rech. agron., Paris, Sér. A., Ann. agron.* 1955, **6**, No. 5, 683–958, illus.

1. The outward diffusion of phosphoric acid from rye grains. By P. Boischot and J. Lajon (Versailles), p. 751. 100 grains of rye were placed in 250 c.c. distilled water, which was changed daily, and the amount of P_2O_5 which had passed out of the grains into the solution was measured. At first the amount was small, but by the 12th to 13th day it had attained a maximum of 1–1·5 mg. The maximum attained increased with temperature.

2. Influence of the nature of the N fertilizer on plant biochemistry. By P. Gouny (Antibes), p. 752. Results reported in *Fld Crop Abstr.* 9 : 295 and *Soils and Ferts* 19 : 369 were confirmed. Experiments on the building up of carbohydrates and organic acids revealed that nutrition with ammoniacal N resulted in a reduced sugar content and insufficient organic acid.

3. The mineral nutrition of higher plants. By R. Chaminade and R. Blanchet (Versailles), pp. 754–7. This is a study, using rye, of the absorption of the various mineral elements, the plant's reaction to the composition of the medium, its utilization of the elements absorbed, and the relationships between osmotic pressure, transpiration, and nutrient medium.

4. "Thiroku", a Japanese variety of rice. By F. Huguet and J. Bordas (Avignon), pp. 759–661. Thiroku was compared with Balilla. In its early stages Thiroku was slower in growth and tillering, and the plant remained shorter, but its reproductive phase began about 5 weeks earlier than in Balilla and hence could proceed and be completed before the onset of bad weather. This variety, which also has great resistance to shedding of grains, can be regarded as a safe one for cool seasons such as 1954. Two manurial tests were applied to this variety. (i) Urea, in a concentrated solution, sprayed 3–4 times on the leaves with an atomizer, 8 days before ear emergence, gave a yield of 6480 kg./ha. which was higher than the yield (5430 kg./ha.) obtained when urea was spread over the soil. (ii) Nitrogen was applied, as a soil dressing, in the form of urea and of ammonium sulphate. Each gave satisfactory yields of 5454 and 5634 kg. grain per ha., respectively.

5. New techniques in rice cultivation. By F. Huguet (Avignon), pp. 761–4. (i) Leaf spraying with relatively high concentrations of a urea solution can be used as a supplementary means of applying N fertilizer to overcome the difficulties arising from submergence of the soil and consequent loss of nutrients. (ii) An attempt was made to grow rice seedlings ready for transplanting on a required date, using a herbagère. An account is given of growth of seedlings in the herbagère, the transplanting process, and the growth and development of the transplanted rice plant.

6. Productivity of maize in Dijon. By G. Matthieu (Dijon), pp. 764–5. As in the South of France, water appears to be the limiting factor. By heavy manuring and underground irrigation Wisconsin 255 yielded 10,000 kg. grain/ha. The harvested maize (grain and straw) produced 211 kg. N [per ha.] with, and 152 kg. without, irrigation. The application of 200 kg. N [per ha.] was therefore justified under irrigation. The recovery of K_2O and P_2O_5 was poor, but greater with, than without, irrigation. [See also *Fld Crop Abstr.* 7 : 1449 and 9 : 295.]

7. Some varieties of rape. By E. Radet (Châlons), pp. 770–2. Taking into account regularity of vegetative growth, resistance to bursting of pods, and yield, the best varieties were Matador 282 and Nain de Hamburg 460 which gave, respectively, 2160 and 2170 kg. of seed per ha. Alsace, the standard for comparison, gave 1830 kg. Matador 282 had the highest oil content, followed, in order, by Alsace-Moselle, Nains de Hambourg 460 and 277A, Valois, and Hybride 358 A.—D.B.

787 **France.** Institut de Recherches du Coton et des Textiles Exotiques. Activité de l'IRCT. Année 1954. [The work of the IRCT during 1954.] *Cot. et Fibr. trop.* 1955, **10**, No. 2, 81–256, illus.

Investigations reported on jute substitutes: French Equatorial Africa. Madingou Station, pp. 231–38. *Hibiscus cannabinus* has a vegetative cycle of 150 days, rarely exceeds a mean height of 2·5 m. and produces 1200–1800 kg. of fibre per ha. A green-stemmed variety, *vulgaris*, yields slightly more than either *viridis* or red-stemmed varieties. Sowing early in October gives better fibre returns than later sowings, 30 kg. seed sown in rows 18 cm. apart can produce 2063 kg. fibre per ha. and, with 60–cm. intervals along the rows, yields the best seed harvest. To avoid dampness during ripening, early types should be harvested in March and late types in June. With *Urena lobata*, stem canker is not serious and yields of up to 2–3 tons dried fibre/ha. are reported, with but 2–4% of canker-infested plants at harvest. Optimal sowing rate is 47 kg./ha. in rows 18 cm. apart (giving 14 plants per m. row). Dung, with N and P artificial fertilizers, increases dried fibre yields by 31%, potash has no fertilizing effect but 1 ton lime/ha. is advantageous. Early sowing encourages greater plant height.

Morocco. Tadla Station, p. 239. Recent introductions include an early-ripening *Abutilon indicum* and 2 tall Sudan *H. cannabinus* varieties. *H. cannabinus* should be sown in early April in rows 20 cm. apart and at 5–cm. intervals along the row.

Algeria. Hamadena Station, pp. 240–41. *H. cannabinus* begins flowering in early September, and,

in saline soils, develops normally on ridges. May sowings are too late and coincide with the first cotton harvest. [See also Abs. 667]—M.H.F.

788 **France.** Congrès International de la Science du Sol. Rapports. Vol. D. [**Reports. Vol. D.**] Paris, 1956, pp. 755.

Among the papers presented were the following :

1. Wheat manuring in New Zealand. By P. B. Lynch, pp. 7–12, bibl. 4.

2. [The effectiveness of organic fertilizers applied to maize crops in the principal soil types of the Rumanian Republic.] [French] By D. Davidescu, pp. 21–4, bibl. 1. When farm-yard manure is the only fertilizer applied, 20 tons per ha. are best on most soils.

3. [Attempt at determining the deficiency limit of potash in soil and plants. Observations made at Lake Alaotra Agronomic Station, Madagascar.] [French] By P. Roche and others, pp. 25–30. The deficiency limit of exchangeable potash in the soil is about 0·03 and 0·06 parts per thousand for cassava and groundnuts, respectively. There is a K-deficiency in cassava leaves (open leaves) when their K content is less than 0·6%, and a K-deficiency in groundnut leaves (basal leaves) when their K content is less than 0·48%.

4. [A contribution to the study of micro-elements in plant nutrition and manuring.] [French] By S. Nikolic, pp. 85–90, bibl. 11. This is a study with oats in Yugoslavia.

5. Translocation of mineral nutrients in crops. By A. Okuda and Z. Kasai, pp. 99–106. [See also *Fld Crop Abstr.* 9 : 1334.]

6. [Influence of humic products on plant assimilation.] [German] By E. Saalbach, pp. 107–11, bibl. 11. The influence of humic acids, isolated from a black earth, on the growth of rye seedlings was investigated.

7. Influence of fertilizers on the yield and composition of the grain in wheat cultivation in calcareous soils. By M. Chaves S. and F. González G., pp. 231–8.

8. Comparisons of broadcasting and placing fertilizers for swedes and turnips. By J. W. S. Reith, pp. 239–45, bibl. 2.

9. Growth and root development of spring wheat on various loam profiles underlain by sand in relation to the fertilization of the subsoil. By J. J. Schuurman and M. A. J. Goedewaagen, pp. 325–34. [See *Fld Crop Abstr.* 10 : 397.]

10. Cotton yields in the Sudan Gezira as affected by rotation. By T. N. Jewitt, pp. 427–32. Long-term rotation trials showed the good effect of fallowing on subsequent cotton yields. The growing of *Dolichos lablab* had generally a slightly better effect on cotton yields than a fallow. Sorghum, grown immediately before cotton, affected cotton yields adversely.

11. [Soil conservation in Lake Alaotra region, Madagascar.] [French] By P. Roche, pp. 489–94. Information is given on suitable crop rotations including groundnuts and forage crops.

12. Water requirements of the south Pannonian chernozem [Yugoslavia] and the effect of its irrigation [on maize]. By V. Neugebauer and N. Miljkovic, pp. 577–83, bibl. 17.

13. A regional approach to the analysis of drought incidence [in the USA]. By C. N. M. van Bavel, pp. 653–60, bibl. 3. [See also *Fld Crop Abstr.* 6 : 1581.]—E.B.O.

789 **Germany.** Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin. Report on results of cultivation trials in 1954. *Z. landw. Versuchs- u. Untersuchwes.* 1955, **1**, No. 4, 377–86, bibl. 5, illus.

1. Sowing dates for sugar-beet (trials conducted by Institutes at Jena, Halle/Lauchstädt, Leipzig and Rostock). Better yields were obtained from sowing in mid-April than from later sowings from end-of April to mid-May. The normal farm practice is therefore too late.

2. Sowing dates for winter-rape and winter-turnip-rape (conducted by Rostock Institute). (a) Winter-rape. Seed- and oil-yield decreased with lateness of sowing date (from 13.8.53 to 10.9.53). A marked falling off in yield occurred when sown after 27.8.53. (b) Winter-turnip-rape. The first week in September is usually the best sowing date for the coastal region, but, in the year under consideration, sowing on 17.9.53 gave the highest yields of seed and oil. These results, which were statistically significant, illustrate the false conclusions which can be drawn from 1-year data.

3. Cultivation methods for winter-rape (conducted by the Institutes at Rostock, Potsdam, Jena, Bad Lauchstädt and Leipzig). Spring-hoeing, or autumn- and spring-hoeing, resulted in much higher seed yields than did autumn-hoeing.

4. Sowing date for mustard (conducted by the Institute at Halle/Lauchstädt). The variety Maleksberger gave highest yields when sown early (14.3.54). This confirms earlier experiments (1948–50) and indicates the need for a change in the farming practice of sowing later.—D.B.

790 **Sierra Leone.** Report on the work of the Department of Agriculture, 1954. London, 1956, pp. 33.

Investigations reported :

1. Fertilizer trials, Njala, p. 9. The use of sulphate of potash on cassava enhanced the effect of superphosphate, when heavy dressings were applied.

2. Groundnuts, Njala, p. 9. Plots sown early in April yielded 1065 lb. of dry unshelled nuts per ac., whereas plots sown on 1 July failed. The varieties Kono and Maris were superior to Temne and Sotina.

3. Yams, Njala, p. 9. Plants capped with organic manure gave higher yields than those receiving fertilizer alone; highest yields were obtained from a combination of these treatments.
4. Continuous cultivation of annual crops, Njala, pp. 9 and 32–3. The cropping sequence was carried out as before [see *Fld Crop Abstr.* 9 : 296]. Yields in the 3 years of the trial were not consistent and in 1954 the actual food value produced was much lower than in the 2 preceding years.
5. Mangrove swamp reclamation, p. 16. 2,4-D at 6 or 10 lb. a.e. per ac., or 2,4,5-T or MCPA at 10 lb. a.e. per ac., painted onto the bark and into cuts of *Rhizophora*, resulted in defoliation and death of the trees.
6. Rice trials, Bonthe circle, p. 17. Top-yielding varieties were Siam, Radin China and C 24/102. Time-of-sowing trials indicated that for optimum yields sowing should be carried out between 27 March and the end of April at Subu; before 17 April at Massa; between 17 April and 7 May at Gandema. Indo China 53 continued to be the top-yielding variety on deep-flooding grasslands.
7. Yams, Colony Circle, pp. 23–4. April-planted Chinese yams [*Dioscorea esculenta*] greatly outyielded May-planted yams when 20 tons FYM were applied and the plants were capped with organic manure.—M.P.

791 **Nigeria.** Department of Agriculture, Northern Region of Nigeria. Annual Report 1954–5. Part 2. Research and Specialist Services. Kaduna, [n.d.], pp. 100, illus. [Received April, 1956]

INVESTIGATIONS REPORTED :

1. Agronomy section, pp. 3–15. (a) Groundnuts, pp. 4–6. Seed of the variety Castle Cary deteriorated when introduced and grown at Daura; reduction in yield was due to poor germination and poorer survival ability. At Kafinsoli, spreading varieties yielded better spaced at 6 × 36 in. and 9 × 36 in., than at 18 × 36 in. Trials at Kontagora indicated the advisability of sowing in early-May. When grown in the drier zone, Kano 50 did not maintain its superiority over Local Spreading. (b) Guinea corn, pp. 6–7. Heavy infection with *Striga senegalensis* decreased grain yields significantly; hand-pulling of the parasite and an application of 3 or 10 tons FYM per ac. resulted in increased yields. (c) Soyabeans, p. 8. June was the optimum sowing month at Kontagora. (d) Cowpeas, pp. 8–9. The varieties New Era and Mauritius, grown alone, outyielded the local variety but did not maintain their superiority when interplanted with yams. Optimum spacing rates were : 1 stand between yams 3 ft. apart on 6-ft. ridges for the local variety; 2 stands 3 ft. apart on 6-ft. ridges for Mauritius; New Era was indifferent to spacing. (e) Rotations and fertilizers, pp. 9–15. Results were similar to those noted in the previous year, except that monocropping reduced seed-cotton yields at both low and high soil fertility. Yields of millet and groundnuts, monocropped at Kano for 24 years and receiving 3 tons of FYM per ac. annually, were 786 and 915 lb. threshed seed per ac., respectively; where no FYM had been applied, yields were 252 and 461 lb. per ac., respectively. The most economic returns were obtained at Samaru from the application of one-third of the FYM dressing to each crop of cotton, groundnuts and guinea corn, although the yield of guinea corn was lower than that obtained when all the FYM was given to this crop.
2. Botany section, pp. 14–42. The American sorghum varieties Ladore and Hegari were again the best yielders at Samaru. In several localities, sowing the crop later than May or June, in order to avoid ripening during the wet season, resulted in negligible yields. At Yandev, the soyabean varieties Bilomi No. 3, Yellow Bermelly and Malayan have been outstanding over the 3 trial years. At Kontagora, Yellow Bermelly was top yielder. The optimum length for Dan Warri cassava cuttings at Samaru was 12–15 in. The groundnut varieties Kano 50, MK 383 and 374 yielded best at Kano; at Yandev the early varieties Natal Common and Spanish 205, outyielded the later varieties, but the haulm yields of the latter were greater, as the leaves were still green and attached when harvested. Dormancy studies at Samaru indicated that mature seeds of early varieties germinated in the ground when watered for 2 weeks after a dry spell, whereas long-season varieties did not sprout even after 4 weeks of watering.
3. Chemistry section, pp. 42–67. The effect of S deficiency was noted in the leaves of groundnut plants. Compared with P, S produced a relatively higher response in the haulms than in the kernels. The ratio of response P : S was 3 : 4 in the haulms and 2 : 1 in the kernels. Superphosphate appears to meet the demands of groundnuts. Previous fertilizer results with yams in Ilorin Province were confirmed. In the Benue Province, 1–2 cwt. ammonium sulphate greatly increased yam yields. In many of the fertilizer experiments carried out on a range of crops, the response to N was marked, but to P was slight. In the Northern Belt of the region, placement of superphosphate 1 in. from the seed of food crops was better than mixing the fertilizer with the seed; for cotton the fertilizer could be safely mixed with the seed.
4. Cotton, pp. 68–89. [See *Fld Crop Abstr.* 9 : 1321.]—M.P.

792 **Tanganyika** Agricultural Corporation. Report and accounts for the period 1st April to 30th September 1955. Dar-es-Salaam, 1956, pp. 83, 4s.

INVESTIGATIONS REPORTED :

1. Agronomy, Nachingwea, pp. 11–12. The maximum recoverable yield, by digging, of the late-sown groundnut variety Asirya Mwitunde was obtained 107–114 days after sowing. At 107 days, 75% of the pods were full-sized and firm. In a late-sown trials, more pods were produced per unit length of row at 2- or 4-in. spacings than at 6-, 8-, or 12-in. spacings.

2. Fertilizer experiments, Nachingwea, pp. 12–16. NPK trials were carried out on maize, soyabeans and groundnuts. In most cases N increased crop yields, K reduced the yields, whereas responses to P were more variable. Ca was beneficial to yields by reducing soil acidity.

3. Agronomy, Urambo, 35–43. The local rice varieties, particularly Faya, Sindano, Ambarikore, Senna and Maji Maji maintained their superiority over introduced varieties. The top-yielding bulrush millet [*Pennisetum typhoideum*] varieties were Wuyan, Bajima *ex* Boma, Dauro, Zongo *ex* Gusan and Maiwa *ex* Shika ; most of the high-yielding varieties were from Nigeria. The best soyabean varieties were Soya 16, Benares and Yellow Kedeli. Sword bean [*Canavalia ensiformis*] continues to be of value in maintaining fertility in a rotation, particularly as the crop to precede cereals. For green-manure it has been found to be superior to velvet beans in many respects. Seed production appeared to be dependent on the availability of sub-soil moisture. Bambarra groundnut [*Voandzeia subterranea*] did well in the area, but a wide spacing of 36 × 6 in. was unsatisfactory. Amongst the best sorghum varieties were : two Red Combine selections, Kano, L 33, 31, 26 and 20. The velvet bean [*Stizolobium* spp.] variety No. 42 gave the highest yield and the longest ground cover ; No. 54 and Somerset were satisfactory yielders but defoliation occurred most rapidly and completely in the latter variety.

4. A preliminary study of the effects of sodium monochloroacetate applied to a standing crop of soyabean, pp. 37–8. The use of Na monochloroacetate as a desiccant, applied at 8 lb. per ac. to a standing crop of soyabeans, successfully defoliated the crop and markedly decelerated the bursting of the seed capsules. It also defoliated most of the weeds encountered.—M.P.

793 **Nyasaland Protectorate.** Annual Report of the Department of Agriculture for the year 1954–55. Pt. 2. Zomba, 1956, pp. 75, 3s. 6d.

INVESTIGATIONS REPORTED :

1. Maize, pp. 2–13. Results of varietal trials showed the importance of regional adaptation for the success of the strains.

2. Wheat, p. 14. The variety 337 gave the highest yield when sown in mid-January, but varieties 184 and 318 continue to be more reliable.

3. Cassava, p. 15. Late planting (February) decreased the yield per plant and the size of the roots, and in comparison with the December plantings, growth in later-planted plots was stunted and uneven. The stand on plots planted with 3-node cuttings was much poorer than on those planted with 8-node cuttings, with a consequent reduction in total yield.

4. Sweet-potatoes, pp. 15–16. The best varieties were Mkokabwato, Malamulo and Kamciputo ; they were palatable and kept well.

5. Groundnuts, pp. 16–17. At Mbawa, the late-maturing types gave the highest yields ; at Tuchila, Chitela and Makanga, the early varieties were always best ; whilst at Chitedze, the results varied with the weather. Results confirmed the value of early sowing and correct harvesting [100 days after sowing] of Spanish Bunch and other non-dormant varieties. Perenox, at 2·5 lb. in 100 gal. of water per ac. was better than Blitane (at 1·5 lb. per ac.) for the control of *Cercospora* leaf spot. Blitane increased the yield of Gambia but not of Mwitunde.

6. Soyabeans, pp. 17–19. Early sowing, seed inoculation and sowing in 2 rows per 6-in. ridge increased the yields of soyabeans at the Tung Station.

7. Rotation experiments, pp. 23–4. In most localities, maize benefited from 100 lb. ammonium sulphate per ac. and from a preceding groundnut crop. At Chitedze, the value of velvet beans and sunnhemp as green manures, was noticeable.

8. Cotton, pp. 57–61. [See *Fld Crop Abstr.* 9 : 546.] —M.P.

794 **Federation of Rhodesia and Nyasaland.** Federal Ministry of Agriculture. Report of the Secretary to the Federal Ministry of Agriculture, which includes the Departments of Research and Specialist Services, Conservation and Extension Services and Veterinary Services, for the year ended 30th September, 1955. Salisbury, 1956, pp. 123.

INVESTIGATIONS REPORTED :

1. Salisbury Experiment Station. Results of field crop trials, pp. 20–2. [See *Fld Crop Abstr.* 9 : 1032.]

2. Erosion control research, Henderson Research Station, pp. 34–5 and 85–6. On a 6·5% slope, soil-loss from plots of maize grown; (a) after sunnhemp and at 10,000 plants/ac. ; (b) after maize and at 10,000 plants/ac.; (c) after maize and stubble-mulching and at 15,000 plants/ac., was 5·5, 1·7 and 0·3 tons/ac., respectively, and maize yields were 28, 25 and 43 bags/ac., respectively. [1 bag = 200 lb.] From second-year *Pennisetum purpureum*, and Star grass [*Cynodon plectostachyus*] pastures, soil loss was 0·2 and 0·02 tons/ac., respectively.

3. Grasslands Research Station, Marandellas, pp. 35–43. Three hybrid maize strains from the Salisbury Experiment Station yielded, on average,

80% better than the 4 open-pollinated varieties tested. P was more beneficial to crop yields when banded or broadcast and ploughed-in than when broadcast onto the soil surface. Contrary to results in 1953–4 no significant interaction was found between population and P application.

4. Matopos Research Station, pp. 45–9. Grain yields of the best maize varieties, 52DH29, 52DH32, Kalahari and Potchefstroom Pearl were 30·5, 26·8, 22·8 and 22·4 bags/ac. The top-yielding sorghum varieties were Rustenberg, 5152, Early Hegari, 5164 and Plainsman. As a means of raising soil fertility, applying fertilizers to arable land was superior to kraaling cattle on the land in winter.

5. Sabi Valley Experiment Station, pp. 51–4. The optimum sowing time for cotton appears to be November. Rate-of-seeding trials with wheat indicated that 45 lb./ac. was the optimum rate ; sowing after 1 May resulted in considerably reduced yields. The most outstanding of the new wheat selections were 261RFC 1B, B 253, Warigo and Burbank ; Regent was a lower yielder, but appeared to be immune to local races of rust. Sabi X-1 did not maintain its promise of the previous year owing to its rust susceptibility. Of 42 rice varieties in the original collection, Ambarikore was the only promising variety left. Maize receiving 30 lb. N/ac. on the wheat crop residue and 30 lb. on the maize (when plants were knee-high) yielded 26 and 19 bags/ac., at plant populations of 14,500 and 23,300/ac., respectively. An additional 60 lb. N/ac. increased the yield of maize to 28 bags/ac. at the higher population.—M.P.

795 **Bechuanaland Protectorate** Department of Agriculture. Annual Report, 1955. Mahalapye, [n.d.], pp. 24 + append. pp. 16, illus. [Received Dec., 1956]

INVESTIGATIONS REPORTED :

1. Fertilizer and manurial trials, pp. 12–13 and append. At Lobatsi, 100 lb. superphosphate per ac. was the most economical dressing for maize (variety Kalahari). Applications of 3 tons of kraal manure alone per ac., gave significantly lower maize yields than a combined dressing of 1·5 tons kraal manure and 100 lb. superphosphate per ac.

2. Agronomic investigations, pp. 14–15 and append. At Mahalapye, the maize variety Kalahari yielded 3940, 3509, 3229 and 2806 lb. per ac. when spaced at 18, 24, 30 and 36 in. in rows 3 ft. apart. Good weed control in maize, by clean cultivation practices, increased yields by 7 bags per ac. [1 bag = 200 lb.] over the unweeded control. There was no difference due to the method of control used.

3. Crop variety trials, pp. 14–15 and append. At Lobatsi, the maize varieties S.X.G. Early Pearl, Rhodesian Hybrid and Potchefstroom Pearl yielded considerably better than Kalahari and Anveld. At Mahalapye, top-yielding maize varieties were Rhodesian Hybrid No. 1, Top Cross Potchefstroom Pearl, Early Pearl, and S.X.G. Early Pearl. The grain sorghum varieties Hegari and Red Seed Combine were top yielders. The cowpea varieties Katjan, 51.C.295 and 51.C.299 considerably outyielded Blackeye and Mung. Natal Common, Dakar, Improved Spanish and Masambica were the best of the groundnut varieties on trial. Tepary [*Phaseolus* sp.] field beans gave more than double the yield of the other 5 varieties tested.—M.P.

796 **South Africa.** Witwatersrand University, Transvaal. Frankenwald Field Research Station. Annual Report for 1955. Johannesburg, 1956, pp. 26.

INVESTIGATIONS REPORTED :

1. Pre-emergence application of TCA and other weedkillers to maize, with special reference to the control of nutgrass (*Cyperus esculentus*), pp. 12–13. TCA at 5–15 lb./ac. injured the maize seed and its phytotoxicity increased when applied together with fernimine 4 at 1 lb./ac. Control of nutgrass was good at the 15 lb. level, but fair at the 10 and 5 lb. levels. CMU at 2–4 lb. a.e./ac. alone and in combination with fernimine 4 was less harmful to maize-seed germination but gave poorer nutgrass control. Changes in volume rate had little effect on the control obtained. Maize plots treated with CMU and PDU at 2–4 lb./ac. gave higher grain yields than those treated at 0·5 and 1 lb./ac. ; plots treated with fernimine and fernimine 4 at 1 lb./ac. gave yields similar to the lower levels of CMU and PDU.

2. Post-emergence spraying of dicotyledonous weeds, p. 15. Fernimine gave better weed control than fernesta or fernimine 4 at 0·5, 0·75 and 1 lb. a.e. in 20 gal./ac., when used as a pre- or post-flowering spray. The effects of the herbicides on 9 weeds are mentioned.

3. The effect of fertilizer on the water consumption of maize plants, p. 21. Lysimeter studies indicated that maize plants growing on a soil with a high fertility level used water more economically and efficiently than plants on soil of low fertility.—M.P.

797 **Australia.** Commonwealth Scientific and Industrial Research Organization. Seventh Annual Report for the year ending 30th June, 1955. Canberra, 1955, pp. 185. [Received Oct., 1956]

INVESTIGATIONS REPORTED :

1. Safflower, (*Carthamus tinctorius*), p. 26. A between-row spacing of 7 in. was better than 21 or 28 in., and a high sowing-rate better than a low one. In areas of cold, wet winters, spring sowing was satisfactory, in other areas May sowing was not always preferable to June sowing. Under low

moisture conditions, safflower outyielded linseed but the return per ac. was less than for wheat ; with adequate moisture supply, safflower outyielded linseed in terms of oil per ac., and wheat in monetary return.

2. Linseed, p. 26. Some Punjab × Walsh selections were superior to Walsh in yield and oil content, and to Punjab in oil quality and rust resistance.

3. Flowering of skeleton weed (*Chondrilla juncea*), p. 29. [See *Fld Crop Abstr.* 9 : 1360.]

4. Skeleton weed in wheat, p. 30. Competition for N, between the weed and a wheat crop, was severe when soil-N was low ; where fertility was high, the effect of the weed on the yield of wheat was not detectable.

5. Rice, Deniliquin, N.S.W., p. 34. Rice seedling establishment was increased 50%, and stubble-sown subterranean clover establishment 10–20%, in the 4 years following rice, when 2 tons of gypsum per ac. were applied to an alkaline clay soil.

6. Cereal trials, Kojonup, W.A., p. 35. Barley was superior to oats for winter production, but inferior in grain production. The oat varieties Avon and Orient gave the highest grain yields. The wheat varieties Gabo and Insignia 49 were outstanding when sown late, but were slightly inferior to mid-season varieties when sown early.

7. The measurement of evaporation from a growing crop by means of an evapotranspirometer, p. 38. [*See Fld Crop Abstr.* 9 : 610.]

8. Crop studies, Northern Territory, pp. 76–7. Cotton, sorghum and groundnuts did much better after a groundnut crop than when following either of the others. Early varieties of rice required 3·25 ac. ft. of irrigation water ; later-maturing varieties required up to twice as much water. Studies of water losses from fallow soil during the dry season indicated that little purpose is served by fallowing as a water conservation measure from season to season.—M.P.

798 **Australia.** Department of Agriculture and Stock, Queensland. Annual Report for the year 1955–56. Brisbane, 1956, pp. 126, illus.

INVESTIGATIONS REPORTED :

1. Crop trials, pp. 40–1. Oats. Bovah and an American introduction, Benton, were the outstanding varieties in trials at 2 localities. Maize. Trials again indicated that Queensland and Grafton hybrids were suitable for all areas except the Atherton Tableland, whereas the DH and NEH hybrids were suited to the southern portion of the Darling Downs only. Cowpeas. Contrary to results in previous years, the varieties Cristaudo and Giant succumbed during the season to stem rot (*Phytophthora* sp.). The introduced variety CPI 11044 is to be released to farmers.

2. Soil conservation, p. 47. Trials indicated that, on the Darling Downs, deep working and coarse fallowing could be applied to land where erosion-reducing practices of stubble retention were carried out, without prejudicing crop yields. At Atherton, a good Kikuyu grass [*Pennisetum clandestinum*] waterway was able to withstand, undamaged, water velocities of 10·6 ft./sec. At Kairi, run-off from continuous maize plots was 6, 12 and 21 times greater than from grass, lucerne/grass and very roughly ploughed plots, respectively.

3. Crop trials, Hermitage, pp. 49–50. Wheat. Spica, Seafoam and Gabo led the early varieties ; Charter and Celebration led the mid-season varieties. Safflower. Varietal trials indicated that successful crops can be produced from the varieties available ; yields of up to 1550 lb./ac. were obtained. Grain sorghum. Martin, Caprock and Wheatland were the best yielders, in standard varietal trials, with 74, 73 and 72 bu./ac., respectively ; in a rotation trial, Alpha yielded 88 bu./ac.

4. Crop trials, Biloela, pp. 50–1. Wheat. Gabo has given the highest average yield (33·9 bu./ac.) over 5 years. The best seed-rate for wheat was 40–50 lb./ac. Grain sorghum. Martin, Alpha and Wheatland were the best varieties. In seasons with good moisture conditions, row-spacings of 14 and 28 in. outyielded the 42-in. spacing.

5. Crop trials, Ayr, pp. 51–2. Cotton. Promising results were obtained with the defoliant amizol at 1 lb./ac., alone or as an addition to other formulations. Spraying with α naphthalene acetic acid at 10 ppm. or 2,4,5-T at 30 ppm. [rate not stated] restricted boll shedding and raised the yields of seed-cotton. The best yields of maize [75–8 bu./ac.] were given by Q 716, Q 23, Q 719, Victory and Jubilee. The top wheat varieties were Festival and Saga. Orient was the earliest oat variety to mature (78 days), other varieties matured in 110–130 days.

6. Crop trials, Millaroo, p. 53. Leading cotton varieties at this new experiment station were D & PL14, Empire, Miller 610 and Miller 43–9. Maize yielded better at a 36–in. than at a 42–in. row-spacing. The average yield of 6 safflower varieties was 1982 lb./ac. ; the top strain, 4–1BB yielded 2506 lb./ac. The crop was grown without additional fertilizers and with 7·5 in. of irrigation water. The cowpea strains CPI 4932 and Q 3004 gave promise as green manure crops, but seed-setting was poor.

7. Crop studies, Kairi, p. 54. Pre-emergence application of 2,4-D and MCPA to maize was again shown to be no better than early cultivation for weed control. Durum types differed little in yield from dent types of maize ; the former had less diseased grain.

8. Cover crops, p. 59. New Zealand blue lupin which had previously failed to make adequate growth, grew normally after treatment with 5 cwt./ac. of superphosphate.

9. Chemical studies, Brisbane, p. 67. Leaves and stalks of linseed showing symptoms typical of Zn deficiency had a P/Zn ratio of 310 : 1, whereas in healthy plants the ratio was 98 : 1.—M.P.

799 **New Zealand.** Thirtieth Annual Report of the Department of Scientific and Industrial Research. 1956, pp. 73.

1. Potatoes, p. 10. Owing to the extremely dry season at Lincoln, 7 in. of irrigation water were supplied from 15 December to 20 February and yields were increased thereby from 2–5·5 to 9–12·5 tons/ac.

2. Control of crucifer pests, p. 13. Surveys have shown that white butterfly and diamond-back moth are being well checked by the parasites *Pteromalus puparum* and *Angitis cerophaga*, respectively. —J.F.G.

BOOKS

800 FINDLAY, W. M. **Oats : their cultivation and use from ancient times to the present day.** *Aberdeen Univ. Studies No. 137.* 1956, pp. xi + 207, bibl. 34, Edinburgh ; Oliver and Boyd Ltd., 23 × 15 cm., 21s.

This book is not a general account of the oat crop as its title might suggest, but a detailed study of its cultivation and use at present and in bygone days in one agricultural region, and as such reflects the author's deep and intimate knowledge of the crop's husbandry in all its varied aspects under Scottish conditions.

William Findlay's book thus becomes at once a volume of greatest interest and importance to Scottish agriculturists. Nevertheless it contains a wealth of sound practical knowledge for all—practical information which is not readily available elsewhere, and from this standpoint this book should prove of value to all oat producers and processors as well as teachers and students of practical agriculture. In addition, those interested in the historical background of the crop will find much of interest and value.

To the present generation and especially those of us who live " south of the border," however, the varietal picture will appear somewhat unfamiliar, apart, of course, from such famous names as Potato, Castleton Potato, and Victory which are still with us in spite of serious competition from more recently introduced and higher yielding forms. But in spite of the fact that William Findlay's observations were made on the varieties of yesterday the great fund of very practical philosophy provided on the growing of the crop is still applicable and its value remains unimpaired. In many respects it is a pity that no reference is made in this essentially practical book to winter oats, since this is an important crop in more southerly areas of Britain, but again it must be remembered that the author has kept meticulously to his own experiences and observations.

It is to be regretted too that the least commendable section of the book is that covered by the opening chapters, a fact which might give the reader an erroneous impression of its general standard and purpose as a whole. Chapter II could have been improved upon in both content and arrangement by including botanical descriptions of the cultivated oats in addition to the various species which the author has placed into the category of wild oats, so that the part of the chapter dealing with their inter-relationships could be more readily and fully understood. Similarly in the following chapter entitled " selection for improvement," the subject matter has been most inadequately dealt with and would have been best left out of the volume. In this chapter the most important method of improvement, namely that of crossing and selection is dispensed with in little over half a page. However, the true value and purpose of this book should not be sought in these relatively short introductory chapters, but in the eminently practical ones that follow.—D. J. Griffiths. [From *The New Scientist* **1**, No. 2, November, 1956]

801 EGGEBRECHT, H. Rübensaatgut. [**Beet seed.**] 1950, pp. 84, illus., Radebeul ; Neumann Verlag, 21 × 15 cm. [Received January, 1957]

An earlier brochure on beet-seed testing was in such great demand that it was revised, enlarged and illustrated to produce this book in which is concentrated the essence of standard methods for the production, preparation and sale of sugar- and fodder-beet seed. The first section gives the essentials of the standard methods used in the various operations for cultivating and storing the stecklings, for growing the seed-bearing plant, and harvesting and threshing the seed. Another section is devoted to the preparation of the seed for market (drying, cleaning, storage) and to regulations for sampling and for determining purity, moisture content and viability. In a third section (a large proportion of the book), instructions are given for the various stages of seed testing according to German and international standards. Addresses of seed-testing stations in Eastern and Western Germany and a useful subject index conclude the text. The illustrations are instructive, especially the series on seed cleaning and on seed testing.—D. Brown.

802† NORMAN, A. G. [Ed.] **Advances in agronomy. Vol. 8.** 1956, pp. xi + 423, New York ; Academic Press Inc., 23 × 15 cm., $8·80.

Among papers contributed are the following: 1. Field crop production and soil management in the Pacific Northwest. By H. B. Cheney and others ; (2) The evaluation of crop plants for winter hardiness. By S. T. Dexter ; (3) The mineral nutrition of corn [maize] as related to its growth and culture. By L. B. Nelson. [See also *Fld Crop Abstr.* 9 : 317.]—M.H.

803 DUNGAN, G. H. and ROSS, W. A. **Growing field crops.** 1957, pp. xii + 495, illus., New York ; McGraw-Hill Book Co. Inc., 23 × 16 cm.

This book is one of the McGraw-Hill Rural Activities Series and its purpose is " to enable readers to grow crops understandingly." The authors' approach to the many problems which confront the N. American farmer is a very practical and straightforward one. The material is based on the work of scientists and the experiences of farmers and the different aspects of crop production are dealt with from a field operational point of view. Arranged in this way, and with a full glossary and index, it makes a very useful handbook. It is, of course, essentially a book for and about American farming but it also gives a good deal of information which will be of interest to non-Americans. Nineteen maps showing the distribution of the major crops in the USA are included and there is a list of educational films which can be used to supplement the text. A selected bibliography would have been helpful and it is a pity that this has been omitted.—J. K. Larsen.

804 COOPER, M. McG. **Competitive farming.** 1956, pp. xi + 177, London ; Crosby Lockwood and Son Ltd., 20 × 13 cm., 10s. 6d.

805† WYLLIE, J. **Guide to farm management.** 1956, pp. 142, illus., London ; Vinton & Co., Ltd., 19 × 13 cm., 12s. 6d.

This book is intended primarily for agricultural students, young farmers and would-be farmers, and is based on a first-hand study of farm management in Great Britain. The author deals with the organization and management of the individual farm, particularly the principles of good farm management. Consideration is given to the choice of a system of farming, and a series of chapters is devoted to beef, sheep, pig and milk production and one chapter to the economic factors involved in crop production. The information is presented simply, clearly and concisely resulting in a very readable and useful booklet.—M. Pennington.

806 MACKINTOSH, J. **The feeding of dairy cows.** *Bull. 42 (Revised) Min. Agric. Fish. Fd* 1955, pp. 46. [Received Aug., 1956]

This publication is intended primarily for the dairy farmer. Information is given on the efficient and economical feeding of dairy cows ; the use of straw, kale, fodder-beet, sugar-beet for fodder, mangolds, swedes, potatoes, and wet grains as bulky foods is included. A ' ration ready-reckoner ' indicates the lb. of dry matter, starch and protein equivalents in given quantities of many bulky foods and concentrates.—M.P.

807† HOLMES, E. **Practical plant protection.** 1955, pp. xii + 252, bibl. 13, illus., London; Constable & Co., Ltd., 22 × 14 cm., 15s.

This book is intended as a review of the best plant protection practices likely to be of use to the grower rather than a textbook of academic facts ; it deals almost exclusively with problems in Great Britain. —From preface.

808 COBLEY, L. S. **An introduction to the botany of tropical crops.** 1956, pp. xv + 357, bibl. at end of each chapter, illus., London ; Longmans, Green and Co., Ltd., 22 × 15 cm., 37s. 6d.

In this excellent book, most of the well-established tropical crops and a number of less well-known ones are considered.

The work is grouped under Cereal Crops, Sugar-Cane, Vegetable Fibres, Oil Seeds, Leguminous Crops, Starch-storage Crops, Spices, Beverages and Drug Plants, Cultivated Fruits, Vegetable Crops, Rubber, and Essential Oil Crops, and there is a list of references at the end of each chapter. The gums and resins are left out, probably because of F. N. Howes's recent book on the subject, and tropical forage and fodder crops are also omitted. A list of books for further reading and general reference is given at the end of the book, and there are good indexes.

The method of studying the botany of the grasses in the first part of the chapter on Cereal Crops is useful. In the section on rice, two statements are doubtful, i.e. that its original home may perhaps have been Africa, and that it has been cultivated for ' many thousands of years.' It seems strange that all grain sorghums are classed as *Sorghum vulgare*, though Snowden's monograph ' The Cultivated Races of Sorghum', listed in his references, quotes a number of well-established species. Similarly with the bulrush or pearl millet, all are grouped under one species—*Pennisetum typhoideum* (*P. glaucum*), whereas several species exist. This has presumably been done for convenience only, though one wishes that a more detailed attempt had been made to explain the difficult problem of the classification of these cereals.

The suggestion that some wild species of *Echinochloa* produce grain almost as useful as that from cultivated species, and, therefore, might be selected as future cereal crops for certain drier parts of the tropics is particularly interesting. Photographs or figures showing differences between : foxtail or Italian millet (*Setaria italica*) ; the *Panicum* millets ; and the Japanese barnyard millet (*Echinochloa frumentacea*) would have been useful, as the many excellent illustrations in the book only whet the appetite for more !

The importance of tropical pulses is rightly stressed as, in view of the shortage of animal protein in tropical diets, these crops are often the main source of protein.

The section on nitrogen-fixing bacteria in tropical pulse crops (pp. 135–41) includes diagrams of the process of nodule formation in leguminous roots after infection by *Rhizobium* bacteria, and also a series of figures showing the varying types of nodules on certain tropical leguminous crops. The author stresses the fact, nevertheless, that much more work needs to be done to confirm that these crops do in fact maintain soil fertility in the tropics to the extent some have been proved to do in certain temperate regions.—F. R. Irvine.

809 Wain, R. L. and Wightman, F. [Eds.] **The chemistry and mode of action of plant growth substances. Proceedings of a symposium held at Wye College (University of London), July 1955.** 1956, pp. xi + 312, bibl. at end of each chap., illus., London ; Butterworths Scientific Publications, 25 × 16 cm., 55s.

810† Rabinowitch, E. I. **Photosynthesis and related processes. Vol. 2. Pt 2. Kinetics of photosynthesis (continued) ; Addenda to Vol. 1. and Vol. 2. Pt 1.** 1956, pp. xvi + 1211–2088, bibl. at end of chaps., illus., New York ; (London) ; Intersci. Publ., Inc., 24 × 16 cm., £7. 8s.

811† Block, R. J. **Amino acid handbook. Methods and results of protein analysis.** 1956, pp. xiii + 386, Springfield, Illinois, USA ; Charles C. Thomas, 24 × 16 cm.

812 National Academy of Sciences—National Research Council. **Proceedings. First International Conference on the Use of Antibiotics in Agriculture. 19-21 October 1955.** *Publ. 397 Nat. Acad. Sci. Nat. Res. Counc. Washington* 1956, pp. xx + 278, bibl. at end of papers, illus., 25·5 × 18 cm., 20s.

813 Thompson, H. V. and Worden, A. N. **The rabbit.** 1956, pp. xii + 240, bibl. 89, illus., London ; Collins, 20·5 × 14 cm., 16s.

I think the biggest surprise to the average reader of this monograph is that so much is known about the rabbit, its history, life, habits, food and relations with us humans, and, in spite of its economic importance, that all this information has never before been brought together in a readable form. But this book is not just a hash-up of literature and scattered knowledge. The authors are particularly fortunate in that they and their colleagues have been, and are still, doing serious research on rabbits both in field and laboratory. Not only are they able to evaluate the scattered literature and records but, on practically every aspect of rabbit-life, they contribute new and valuable data obtained from their own experience and research.

The chapters on physiology, reproduction, ecology and diseases are permanent text-books of biological information but many of us will be glad to find that the more practical aspects of the rabbit's relationship with farming and forestry have been given equally thorough attention. At last some definite facts have been obtained on the extent of normal damage to cereals and grass, the cost to forestry in fencing and loss of trees—all this brings the total debit against the rabbit to the level of at least £40–£50 million in this country alone. The relative merits and economics of all methods of control are discussed and, of course, it is inevitable that the topical hub of this book should be a clear and concise chapter on myxomatosis and its repercussions.

The facts presented—without political argument—leave no doubt that the *myxoma* virus has already been of great benefit to agricultural production in Britain, Europe and Australia. No one can foresee the eventual course of the rabbit population, whether myxomatosis will remain a steady endemic killer or will lose its virulence and become harmless to the rabbit. At the moment it is wise not to rely entirely on the virus but to use and improve every other means of attack within our knowledge. And this little book is certainly the best pocketful of such knowledge I have come across for a long time.—A. D. Middleton. [From *J. Brit. Grassld Soc.* **12,** No. 1.]

814† Snedecor, G. W. **Statistical methods.** 5th edn 1956, pp. xiii + 534, bibl. at end of each chap., illus., Ames, Iowa ; Iowa State Coll. Press, 24 × 16 cm., 60s.

815 Junta de Exportação do Algodão. Esboço do reconhecimento ecológico-agrícola de Moçambique. Vol. 1 e 2. [**An outline of the ecological-agricultural survey of Mozambique. Vol. 1 and 2.**] 1955, pp. 491, bibl. 173, illus., maps, Eng-

lish summary, Lourenço Marques ; Cent. Invest. Cient. Algodoeira, 28 × 19 cm.

This survey, which includes a study of the climate and vegetation of Mozambique, was carried out with a view to developing and improving cotton-growing, its main object being to determine the areas suitable for this crop. The present situation of cotton in Mozambique is described.—E.B.O.

NEWS ITEMS AND NOTES

Great Britain

816 Herbicides—List of Common Names and Chemical Abbreviations (revised January, 1957). The British Weed Control Council has approved the following list based on that adopted by the Weed Society of America.

* signifies common names approved by B.S.I.
† signifies approval by the Weed Society of America.

CDAA†	2-chloro-N,N-diallylacetamide
CDEA†	2-chloro-N,N-diethylacetamide
CDEC†	2-chloroallyl diethyldithiocarbamate
CIPC†	isopropyl N-(3-chlorophenyl)carbamate
4–CPA†	4-chlorophenoxyacetic acid
4–CPB	4-(4-chlorophenoxy)butyric acid
2,4–D†*	2,4-dichlorophenoxyacetic acid
3,4–DA†	3,4-dichlorophenoxyacetic acid
dalapon †	2,2-dichloropropionic acid
2,4–DB	4-(2,4-dichlorophenoxy)butyric acid
2,4–DEB†	2,4-dichlorophenoxyethyl benzoate
2,4–DES†	sodium 2,4-dichlorophenoxyethyl sulphate
dinosam*	4,6-dinitro-o-sec-amylphenol *or* 2-(1-methyl-n-butyl)-4,6-dinitrophenol
dinoseb*	4,6-dinitro-o-sec-butylphenol *or* 2-(1-methyl-n-propyl)-4,6-dinitrophenol
diuron †	N-(3,4-dichlorophenyl)-N′,N′-dimethylurea
DNC †*	3,5-dinitro-o-cresol *or* 2-methyl-4,6-dinitrophenol
endothal †	3,6-endoxohexahydrophthalic acid
fenuron †	N-(phenyl)-N′,N′-dimethylurea
MCPA †*	4-chloro-2-methylphenoxyacetic acid
MCPB	4-(4-chloro-2-methylphenoxy)butyric acid
MCPES †	sodium 4-chloro-2-methylphenoxyethyl sulphate
monuron †	N-(4-chlorophenyl)-N′,N′-dimethylurea
neburon †	3-(3,4-dichlorophenyl)-n-butyl-1-methyl urea
NPA †	N-l-naphthyl phthalamic acid
PCP †	pentachlorophenol
PMA †	phenyl mercuric acetate
propham *	isopropyl N-phenylcarbamate
simazin	2-chloro-4,6-bis(ethylamino)-s-triazine
2,4,5-T †*	2,4,5-trichlorophenoxyacetic acid
2,4,5-TB	4-(2,4,5-trichlorophenoxy)butyric acid
2,3,6-TBA†	2,3,6-trichlorobenzoic acid
TCA †	trichloroacetic acid
2,4,5-TES †	sodium 2,4,5-trichlorophenoxyethyl sulphate
2,4,5-TP	2-(2,4,5-trichlorophenoxy)propionic acid

Not yet approved by British Weed Control Council :

DCU †	dichloral urea
erbon †	2-(2,4,5-trichlorophenoxy)ethyl-2,2-dichloropropionate
MCPP	dl-2(4-chloro-2-methylphenoxy)propionic acid
MH†	maleic hydrazide

Weed Abstr. Vol. 6, No. 1, Jan. 1957.

817 Review Articles. The following is a list of review articles which have appeared in *Field Crop Abstracts* Vols. 8 and 9.

Boyle, P. J. and Baulkwill, W. J. Potatoes: the use of cut setts and the treatment of cut surfaces. 1955, **8**, No. 1, 1–10.

Masefield, G. B. Legislation on the burning of vegetation in the British Colonies. 1955, **8**, No. 2, 71–5.

Thorne, Gillian. Nutrient uptake from leaf sprays by crops. 1955, **8**, No. 3, 147–52.

Cooke, G. W. and Widdowson, F. V. Fertilizer placement for arable and herbage crops. 1955, **8**, No. 4, 233–7.

Woodford, E. K. and Kasasian, L. The control of weeds in cereal crops in Europe by chemical methods. 1956, **9**, No. 1, 1–8.

Soper, M. H. R. Field beans in Great Britain. 1956, **9**, No. 2, 65–70.

Holliday, R. Fodder production from winter-sown cereals and its effect upon grain yield. Part 1. 1956, **9**, No. 3, 129–35.

———— Fodder production from winter-sown cereals and its effect upon grain yield. Part 2. 1956, **9**, No. 4, 207–13.

Greenland

818 Quinoa. In an attempt to introduce a new staple food crop into Greenland, an experiment is to be undertaken there in the cultivation of quinoa [*Chenopodium quinoa*]. It is a hardy plant whose seeds and leaves have long been eaten by the upland natives of Peru, Bolivia and Ecuador where it is considered to be of value as a supplementary source of protein for human nutrition. [See also *Fld Crop Abstr.* 9 : 208.] *World Crops* December, 1956.—M.P.

USSR

819† History of Agricultural Crops. The Russian agricultural journal *Nauka i Peredovoiţ Opyt v Seljskom Hozjaĭstve* [Science and leading experiments in agriculture] contains a section in which the origins and development of crops used in agriculture are recorded. The issue for August (No. 8) 1956 includes the history of *Helianthus annuus* (pp. 76–9) and the issue for October (No. 10) 1956 includes the history of *Gossypium* spp. (pp. 56–8).—M.H.

Italy

820 Northern Limit of Wheat. The growth of wheat, a long-day plant, is influenced by temperature and day-length. B. Salvatori in *Ann. Fac. Agr., Perugia* 1955, **11**, 309–13, explains how the northern limit of wheat cultivation without the photoperiodic stimulus would be 50°–51° latitude, i.e. more than 900 km. south of the actual limit of cultivation which is at 60°. Beyond this limit wheat is grown only in limited areas where there are favourable microclimates.—E.B.O.

India

821 Rice Cultivation. Organized experiments in Bombay State on the Japanese method of cultivating rice were begun in 1952 at several experiment stations. Divergent results have been obtained from different experiment stations. *Poona Agric. Coll. Mag.* August, 1956.—D.B.

Australia

822 Olympic—A New and Improved Wheat, has been produced by the Victorian Department of Agriculture, and is shortly to be released to farmers. In replicated trials throughout the State over the past 6 years, Olympic has outyielded Quadrat by 4·5 bu./ac. and Pinnacle by 4 bu./ac. In the Mallee its performance was similar to that of Insignia. Olympic is a mid-season wheat maturing later than Insignia but slightly earlier than Quadrat and Pinnacle. It produces cream-coloured ears on a fine straw of medium-height. *J. Aust. Inst. agric. Sci.* December, 1956.—M.P.